SOIL SURVEY OF

Hendricks County, Indiana

United States Department of Agriculture
Soil Conservation Service
In cooperation with
Purdue University
Agricultural Experiment Station

Issued November 1974

Major fieldwork for this soil survey was done in the period 1966–70. Soil names and descriptions were approved in 1971. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1970. This survey was made cooperatively by the Soil Conservation Service and the Purdue University Agricultural Experiment Station. It is part of the technical assistance furnished to the Hendricks County Soil and Water Conservation District. Financial assistance was made available by the Board of Commissioners of Hendricks County.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Hendricks County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification and the tree and shrub suitability classification of each. It also shows the page where each soil is described and the page for the capability unit in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and the tree and shrub suitability groups.

Game managers, sportsmen, and others can find general information about the common kinds of wildlife and their habitat needs in the section "Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for recreation areas in the section "Recreation."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Hendricks County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the sections "Climate of Hendricks County" and "Additional Facts About the County."

Cover: **Residential development on Miami, Crosby, and Brookston soils previously used as cropland and woodland.**

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SOIL SURVEY OF HENDRICKS COUNTY, INDIANA

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION

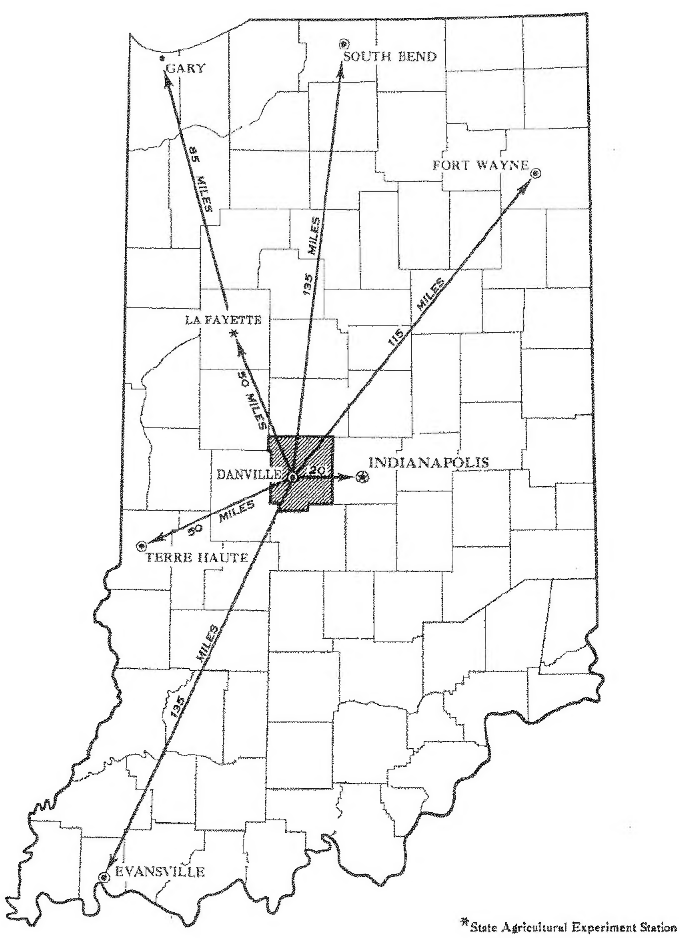

Figure 1.—Location of Hendricks County in Indiana.

HENDRICKS COUNTY is in the central part of Indiana (fig. 1). It has a land area of approximately 417 square miles, or about 266,880 acres. The air distances from Danville, the county seat, to principal cities in Indiana are shown in figure 1.

Farming, mainly of the cash-grain and livestock types, is the main enterprise in the county. The most common practice is to feed the corn crop to hogs and cattle and to market the livestock. Corn and soybeans are the most important crops. Much of the area has poor natural drainage and needs extensive systems of artificial drainage.

In the past few years, industrial and housing developments have expanded in the eastern part of the county. Although the use of soils for farming is emphasized in this soil survey, attention is also given to nonfarm uses.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Hendricks County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of crops and native plants, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Miami and Crosby, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects manage-

ment. For example, Miami silt loam, 2 to 6 percent slopes, eroded, is one phase within the Miami series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series or of different phases within one series. Only one such kind of mapping unit, the soil complex, is shown on the soil map of Hendricks County.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Crosby-Miami silt loams, 2 to 6 percent slopes, eroded, is an example.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or a high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Hendricks County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage and other characteristics that affect their management.

The texture described in the legend of each association is that of the surface layer of the dominant soils. Of the two dominant soils in association 1, for example, one has a surface layer of silt loam (medium texture) and the other has a surface layer of silty clay loam (moderately fine texture).

The seven soil associations in Hendricks County are discussed in the following pages.

1. Fincastle-Ragsdale Association

Deep, somewhat poorly drained and very poorly drained, nearly level and gently sloping, medium-textured and moderately fine textured soils formed in silt-mantled glacial till on uplands

Association 1 is on uplands (fig. 2). It makes up about 9 percent of the land area of Hendricks County. About 76 percent of this association is Fincastle soils, and about 21 percent is Ragsdale soils. The remaining 3 percent is minor soils.

Fincastle soils occupy broad flats at slightly higher elevation than Ragsdale soils. These soils are deep and somewhat poorly drained. They have a medium-textured surface layer and a yellowish-brown, moderately fine textured subsoil that is mottled. These soils are underlain by medium-textured till at a depth of 36 to 70 inches.

Ragsdale soils are in slight depressions that range from fingerlike draws to broad flats. These soils are deep and very poorly drained. They have a moderately fine textured surface layer and a dark-gray and yellowish-brown, moderately fine textured subsoil that is mottled. These soils are underlain by medium-textured till at a depth of 36 to 60 inches.

Minor soils in this association are the moderately well drained Xenia soils and the well-drained Russell soils, both of which are on islandlike knolls and on sides of natural drainageways.

Wetness is the main limitation to use of the soils in this association. Erosion is a hazard where the soils are gently sloping.

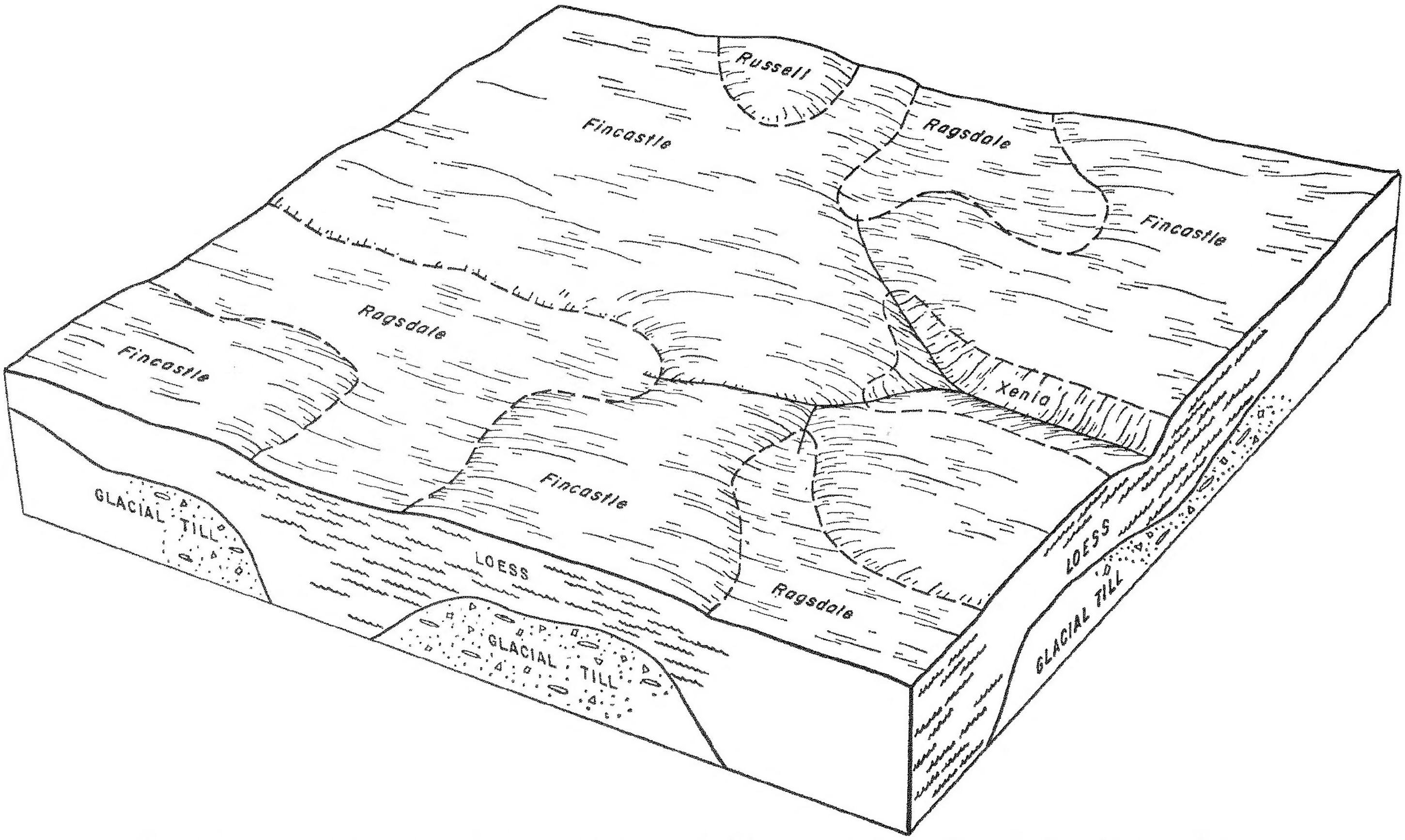

Figure 2.—**General pattern of soils, topography, and underlying material in the Fincastle-Ragsdale association.**

The soils of this association are suited to all crops commonly grown in the county. Under proper management these soils can be used intensively for row crops. Artificial drainage is needed.

2. Crosby-Brookston Association

Deep, somewhat poorly drained and very poorly drained, nearly level and gently sloping, medium-textured and moderately fine textured soils formed in glacial till on uplands

Association 2 is on uplands (fig. 3). It makes up about 52 percent of the land area of Hendricks County. About 55 percent of this association is Crosby soils, and about 40 percent is Brookston soils. The remaining 5 percent is minor soils.

Crosby soils are on oval knolls at slightly higher elevation than Brookston soils. These soils are deep and somewhat poorly drained. They have a medium-textured surface layer and a yellowish-brown, moderately fine textured subsoil that is mottled. Crosby soils are underlain by medium-textured till at a depth of 24 to 42 inches.

Brookston soils are in broad depressions and in narrow, fingerlike areas within areas of Crosby soils. These soils are deep and very poorly drained. The surface layer is moderately fine textured. They have a gray, moderately fine textured subsoil that is mottled. Depth to medium-textured till is between 36 and 50 inches.

Minor soils in this association are the well-drained Miami soils. These soils are on islandlike knolls and on sides of natural drainageways.

Wetness is the main limitation to use of the soils in this association. Where slopes are more than 2 percent, erosion is a hazard.

The soils in this association are suited to all crops commonly grown in the county. Under proper management these soils can be used intensively for row crops. Artificial drainage is needed.

3. Miami-Crosby Association

Deep, well drained and somewhat poorly drained, nearly level to moderately steep, medium-textured and moderately fine textured soils formed in glacial till on uplands

Association 3 is on uplands (fig. 4). It makes up about 19 percent of the land area of Hendricks County. About 68 percent of this association is Miami soils, and about 19 percent is Crosby soils. The remaining 13 percent is minor soils.

Miami soils occupy knolls and sides of natural drainageways. Where these soils are on sides of natural drainageways, they are between Crosby soils and areas of soils on bottom lands and outwash plains. Miami soils are deep, well drained, and gently sloping to moderately steep. They have a medium-textured and moderately fine textured surface layer and a dark yellowish-brown,

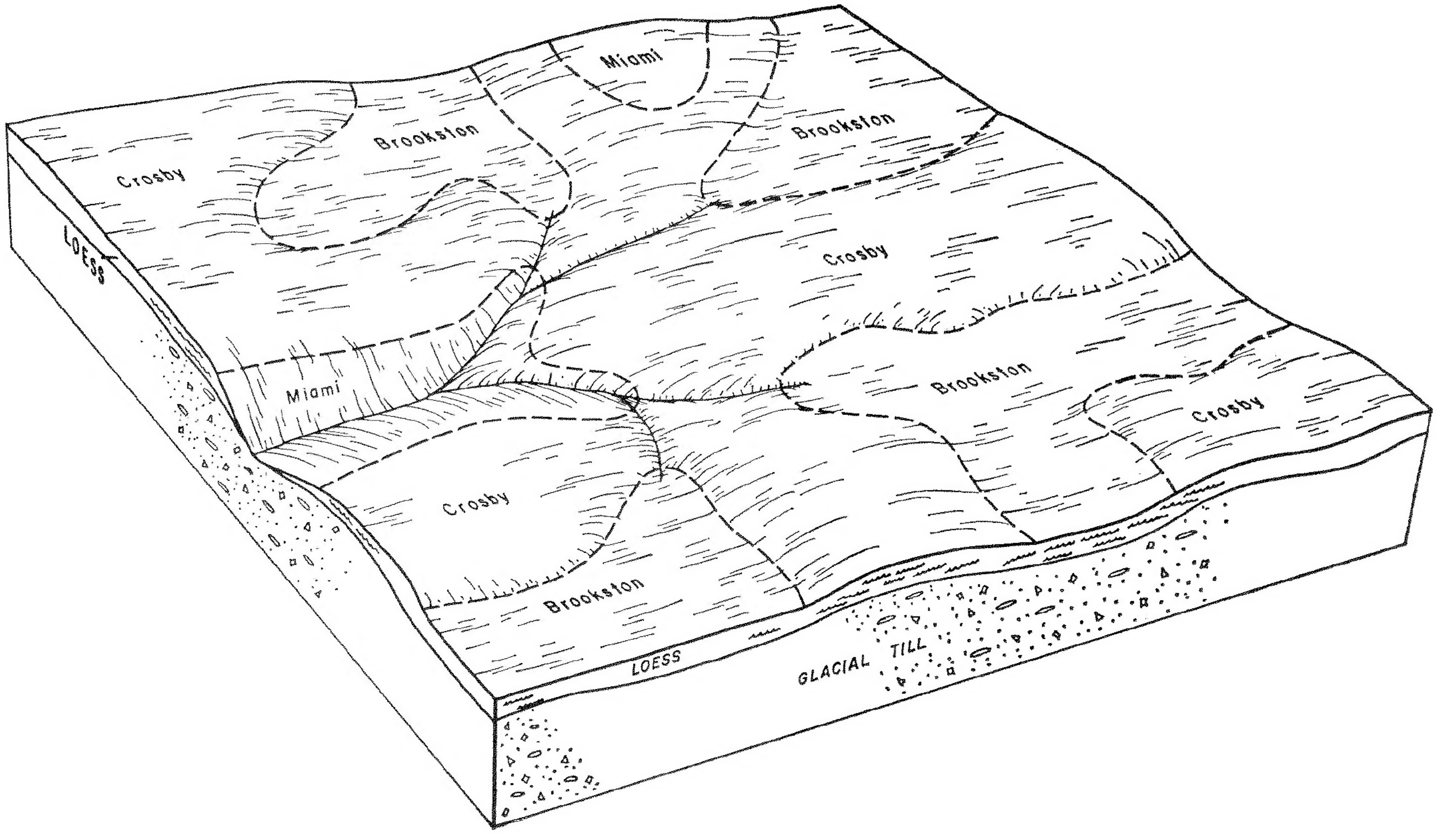

Figure 3.—General pattern for soils, topography, and underlying material in the Crosby-Brookston association.

moderately fine textured subsoil. These soils are underlain by medium-textured till at a depth of 36 to 60 inches.

Crosby soils are in slightly lower areas than Miami soils. They are deep, somewhat poorly drained, and nearly level. These soils have a medium-textured surface layer and a yellowish-brown, moderately fine textured subsoil that is mottled. They are underlain by medium-textured till at a depth of 24 to 42 inches.

Minor soils in this association are the well-drained Hennepin and Genesee soils and the very poorly drained Brookston soils. Hennepin soils are in sharp breaks between areas of soils on bottom lands and Miami soils. Brookston soils are in fingerlike depressions within areas of Crosby and Miami soils. Genesee soils are on bottom lands.

Erosion is the main hazard in the use and management of the soils in this association. Wetness is a limitation to use of the Crosby soils and the less extensive Brookston soils.

The nearly level and gently sloping soils in this association are suited to intensive cropping. The moderately sloping and strongly sloping soils are suited to cropping systems that include hay and pasture plants in addition to the other crops. Corn, soybeans, and small grains are the common crops. The moderately steep soils are suited to permanent pasture. On the more sloping soils, the trend is toward general farming and raising of livestock. A few areas have a cover of hardwoods.

4. Genesee-Shoals Association

Deep, well drained and somewhat poorly drained, nearly level, medium-textured soils formed in alluvium on bottom lands

Association 4 is on first bottoms adjacent to major streams and their tributaries (fig. 5). It makes up about 8 percent of the land area of Hendricks County. About 59 percent of this association is Genesee soils, and about 38 percent is Shoals soil. The remaining 3 percent is minor soils.

Genesee soils are at slightly higher elevation than Shoals soils. These soils are deep and well drained. They have a medium-textured surface layer and a dark grayish-brown and dark-brown, medium-textured subsoil. Genesee soils formed in loamy alluvium.

Shoals soils are deep and somewhat poorly drained. They have a medium-textured surface layer and subsoil. The subsoil is light brownish gray and grayish brown and is mottled. These soils formed in loamy alluvium.

Minor soils in this association are the well-drained Fox soils and the somewhat poorly drained Whitaker soils. Fox soils are on gravelly knolls and Whitaker soils are on outwash plains.

Flooding is a hazard in the use and management of the major soils in this association. Wetness is a limitation to use of the Shoals soils.

The soils of this association are suited to corn, soybeans,

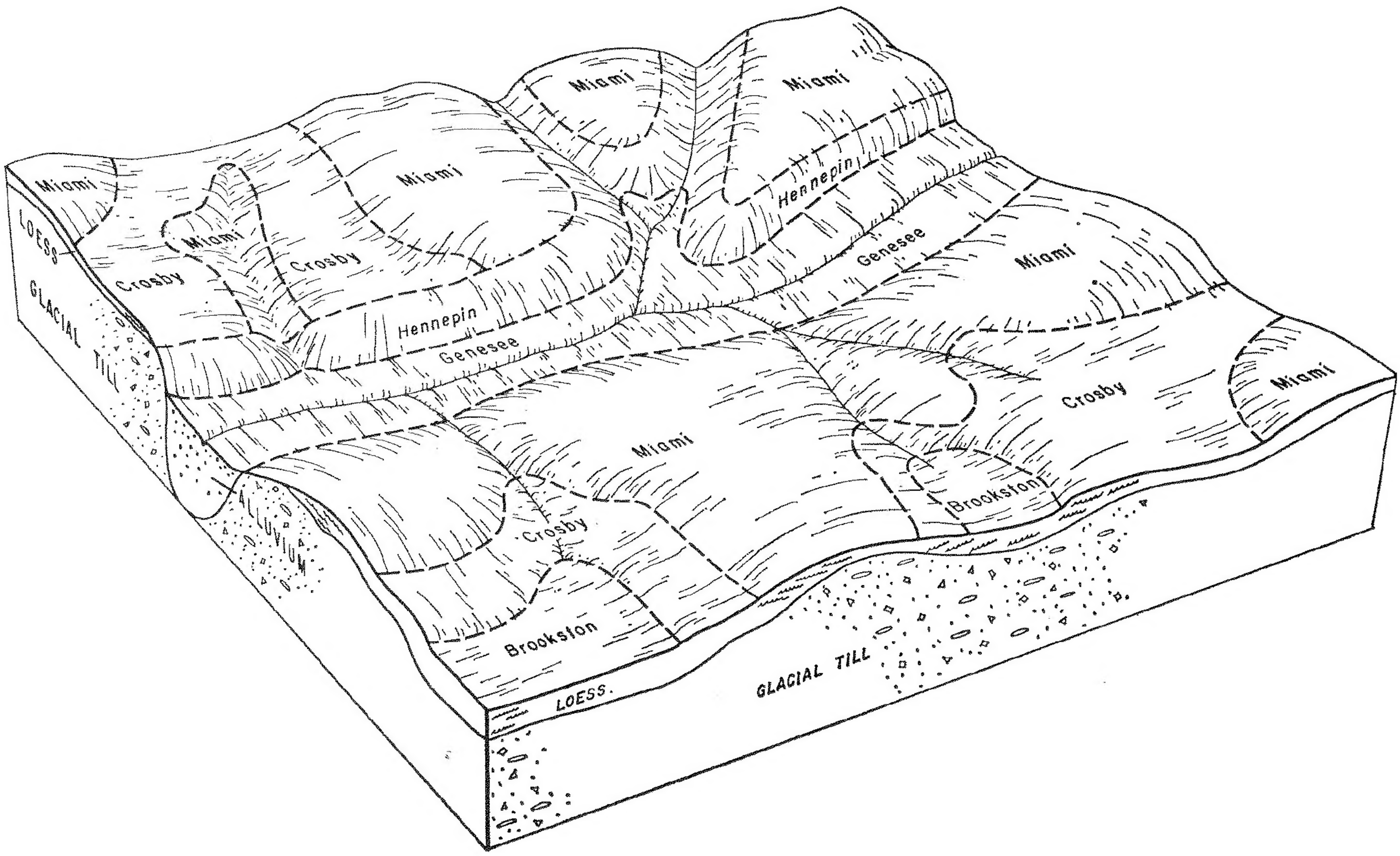

Figure 4.—**General pattern of soils, topography, and underlying material in the Miami-Crosby association.**

and other row crops commonly grown in the county. Under proper management these soils can be used intensively for row crops.

5. Ockley-Martinsville-Fox Association

Well drained, nearly level to moderately sloping, medium-textured and moderately fine textured soils that are deep to moderately deep over sand and gravel; formed in glacial outwash on outwash plains

Association 5 is on outwash plains (fig. 6). It makes up about 4 percent of the land area of Hendricks County. About 42 percent of this association is Ockley soils, about 31 percent is Martinsville soils, and about 21 percent is Fox soils.

Ockley soils are in areas between soils on uplands and soils on bottom lands. These soils are deep, well drained, and nearly level to gently sloping. They have a medium-textured surface layer and a dark-brown, moderately fine textured subsoil. Depth to sand and gravel is between 42 and 60 inches.

Martinsville soils are between soils on uplands and soils on bottom lands. These soils are deep, well drained, and nearly level to gently sloping. They have a medium-textured surface layer and a dark-brown and dark yellowish-brown, moderately fine textured subsoil. Thin layers of stratified silt, sand, and clay are at a depth of about 36 inches.

Fox soils are on sides of natural drainageways and in narrow bands above soils on bottom lands. They are moderately deep over sand and gravel. These soils are well drained and nearly level to moderately sloping. They have a medium-textured and moderately fine textured surface layer and a brown, moderately fine textured subsoil. Depth to sand and gravel is between 24 and 40 inches.

Minor soils in this association are the somewhat poorly drained Whitaker and the very poorly drained Rensselaer soils. Whitaker soils are on outwash plains and in glacial sluiceways, and Rensselaer soils are in old glacial lakebeds and in glacial sluiceways.

Erosion is the main hazard in the use and management of the soils in this association. Droughtiness is a limitation to use of the Fox soils, and wetness is a limitation to use of the less extensive Whitaker and Rensselaer soils.

The nearly level and gently sloping soils in this association are suited to intensive cropping. The moderately sloping soils are suited to hay and pasture and to other crops commonly grown in the county. Corn, soybeans, and small grain are the principal crops. Ockley and Fox soils are a source of sand and gravel.

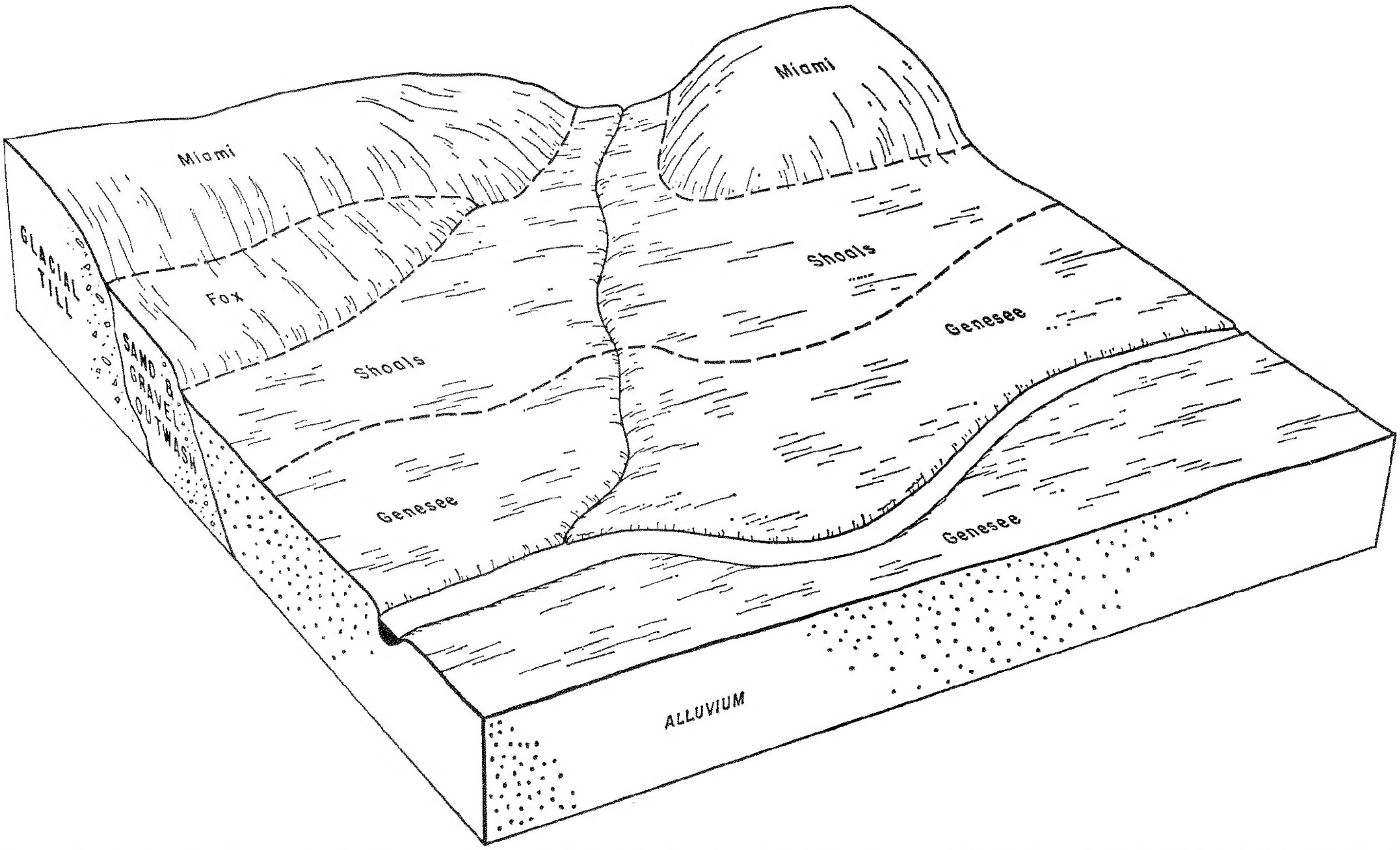

Figure 5.—**General pattern of soils, topography, and underlying material in the Genesee-Shoals association. Miami soils shown at the top of the figure are in association 3.**

6. Rensselaer-Whitaker Association

Deep, very poorly drained and somewhat poorly drained, nearly level, moderately fine textured and medium textured soils formed in glacial outwash on outwash plains, in sluiceways, and in old lakebeds

Association 6 is in old glacial lakebeds, in glacial sluiceways, and on outwash plains (fig. 7). It makes up about 5 percent of the land area of Hendricks County. About 64 percent of this association is Rensselaer soils, and about 30 percent is Whitaker soils. The remaining 6 percent is minor soils.

Rensselaer soils are in broad depressions and in narrow fingerlike areas within areas of Whitaker soils. These soils are deep and very poorly drained. They have a moderately fine textured surface layer and subsoil. The subsoil is dark gray and is mottled. Depth to loamy glacial outwash is between 36 and 48 inches.

Whitaker soils are in oval areas at slightly higher elevation than Rensselaer soils. These soils are deep and somewhat poorly drained. They have a medium-textured surface layer and a yellowish-brown, moderately fine textured subsoil that is mottled. These soils are underlain by loamy glacial outwash.

Minor soils in this association are the well-drained Martinsville soils and the very poorly drained Mahalasville soils. Martinsville soils are on outwash plains and Mahalasville soils are in old glacial lakebeds.

Wetness is the main limitation to use of soils in this association. Erosion is a hazard on the less extensive sloping soils.

The soils of this association are suited to all crops commonly grown in the county. Under proper management these soils can be used intensively for row crops.

7. Xenia-Russell-Miami Association

Deep, moderately well drained and well drained, nearly level to moderately steep, medium-textured and moderately fine textured soils formed in silt-mantled glacial till on uplands

Association 7 is on uplands (fig. 8). It makes up about 3 percent of the land area of Hendricks County. About 44 percent of this association is Xenia soils, about 32 percent is Russell soils, and about 18 percent is Miami soils.

Xenia soils are adjacent to steeper Russell and Miami soils. These soils are deep, moderately well drained, and nearly level or gently sloping. They have a medium-textured surface layer and a yellowish-brown, moderately fine textured subsoil that is mottled. These soils are underlain by medium-textured till at a depth of 36 to 60 inches.

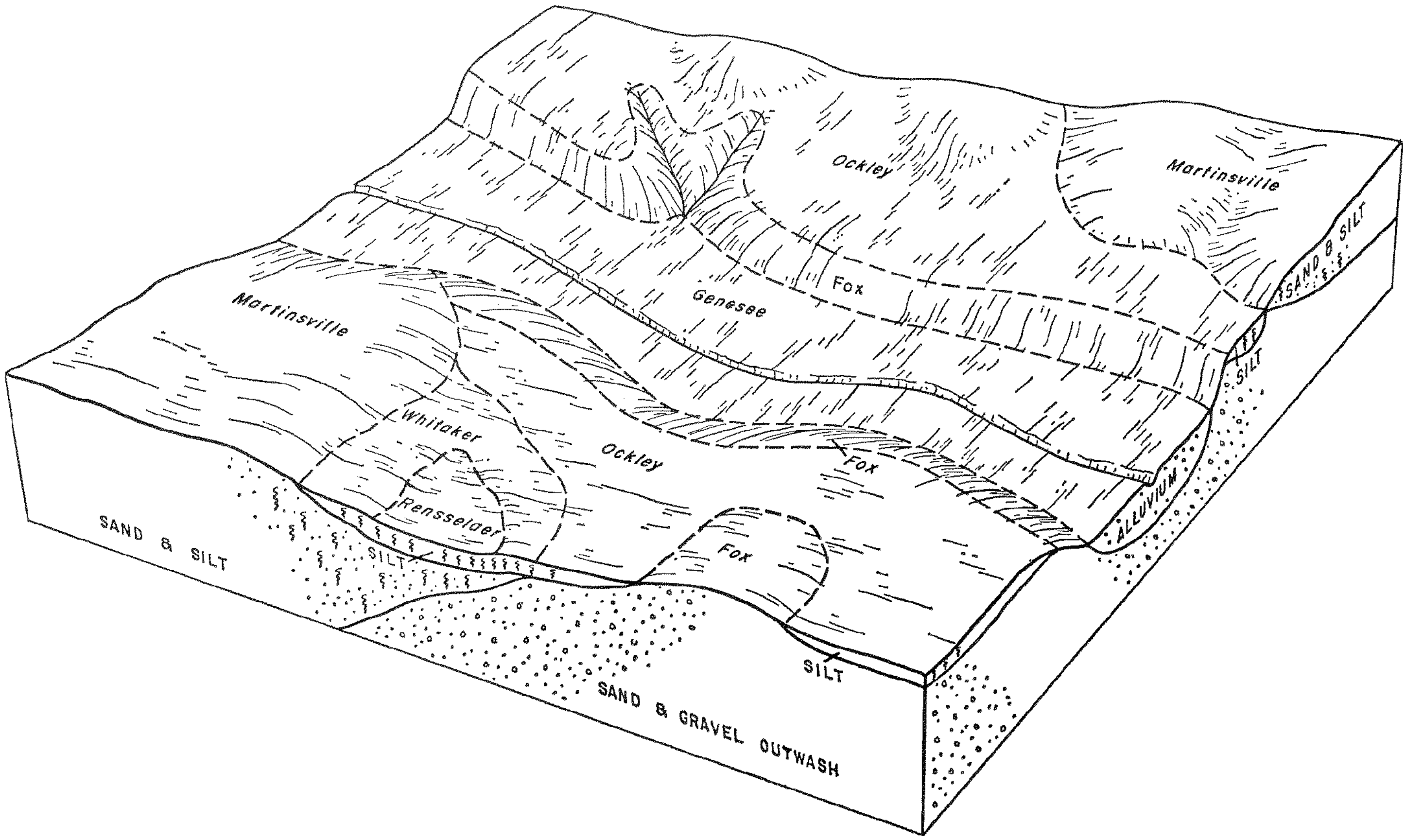

Figure 6.—**General pattern of soils, topography, and underlying material in the Ockley-Martinsville-Fox association. Genesee soils shown in the middle of the diagram are in association 4.**

Russell soils are deep, well drained, and gently sloping or moderately sloping. They have a medium-textured surface layer and a yellowish-brown and brown, moderately fine textured subsoil. These soils are underlain by medium-textured till at a depth of 40 to 70 inches.

Miami soils are on knolls adjacent to Russell soils and on sides of natural drainageways. These soils are deep, well drained, and gently sloping to moderately steep. They have a medium-textured and moderately fine textured surface layer and a dark yellowish-brown, moderately fine textured subsoil. These soils are underlain by medium-textured till at a depth of 24 to 42 inches.

Minor soils of this association are the very poorly drained Ragsdale soils and the somewhat poorly drained Fincastle soils. Fincastle soils are in nearly level areas, and Ragsdale soils are in depressions.

The nearly level and gently sloping soils in this association are suited to intensive cropping. The moderately sloping and strongly sloping soils are suited to cropping systems that include hay and pasture plants in addition to the other crops. The moderately steep soils are suited to permanent pasture. Corn, soybeans, and small grain are the principal crops. On the more sloping soils, the trend is toward general farming and raising of livestock. A few areas have a cover of hardwoods.

Descriptions of the Soils

In this section the soils of Hendricks County are described in detail. The procedure is to describe first a soil series and then the mapping units in that soils series. To get full information on any one mapping unit, it is necessary to read both the description of that unit and the description of the soil series to which it belongs.

The description of each soil series contains two descriptions of one representative soil profile: a short one in paragraph form that gives the information most readers want, and a much more detailed one that scientists, engineers, and others can use in making highly technical interpretations. If the profile of an individual soil differs from the representative profile, the differences are stated in the soil description, unless they are differences that are apparent from the soil name.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit and the tree and shrub suitability group in which the mapping unit has been placed. The page for the description of each capability unit can be learned by referring to the "Guide to Mapping Units" at the back of this survey.

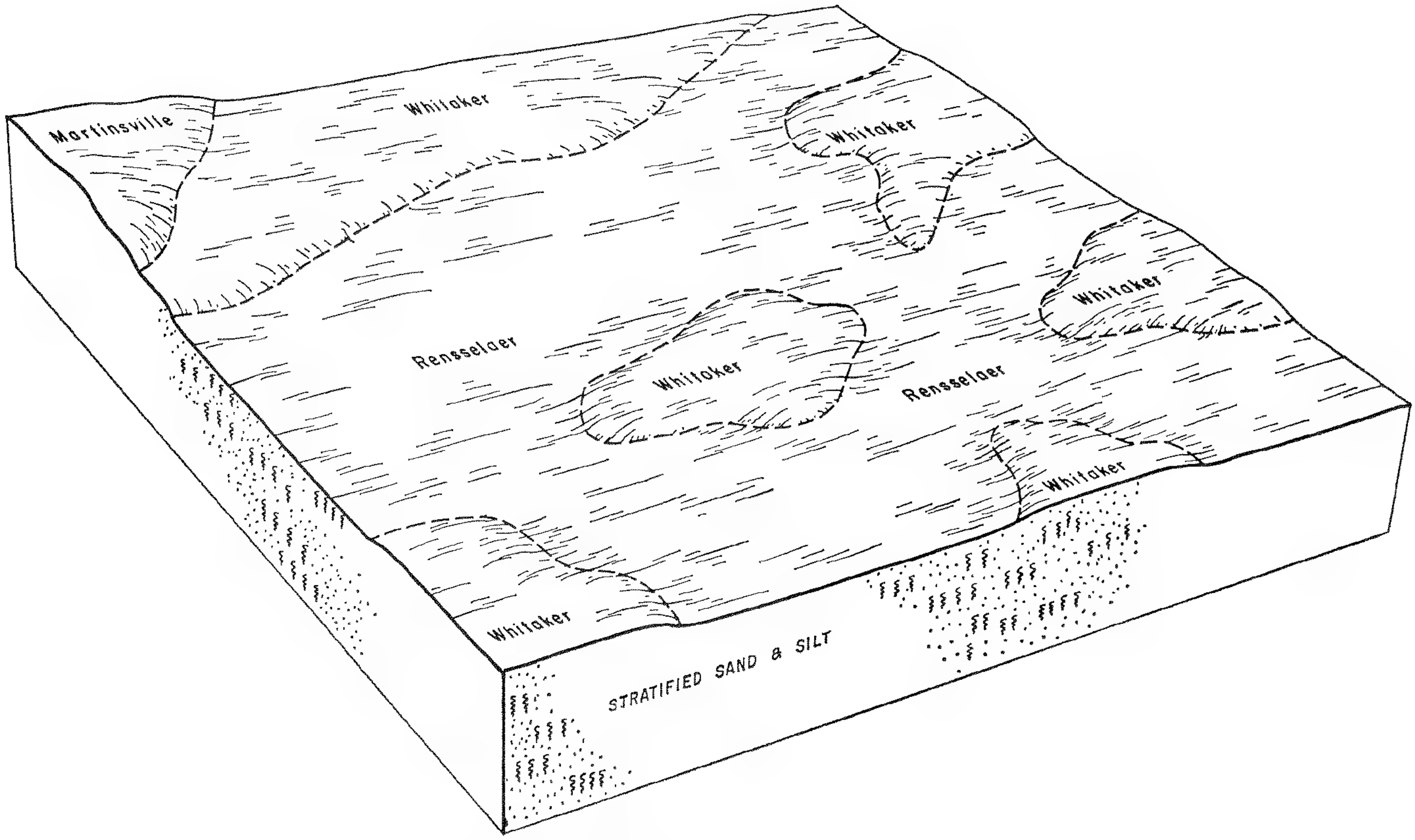

Figure 7.—**General pattern of soils, topography, and underlying material in the Rensselaer-Whitaker association.**

The acreage and proportionate extent of each mapping unit are shown in table 1, p. 10. Many of the terms used in describing soils can be found in the Glossary, and some are defined in the section "How This Survey Was Made." More detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual *(5)*.[1]

Brookston Series

The Brookston series consists of deep, very poorly drained, nearly level soils in depressions on uplands. These soils formed in 24 to 36 inches of silty sediment and underlying loam glacial till. The silty sediment contained some sand and glacial pebbles. The native vegetation consisted of water-tolerant hardwoods and marsh grass.

In a representative profile the surface layer is about 17 inches thick and consists of very dark gray and black silty clay loam. The subsoil is about 33 inches thick and has yellowish-brown and dark yellowish-brown mottles. The upper 19 inches is gray silty clay loam, and the lower 14 inches is dark-gray clay loam. The substratum, at a depth of 50 inches, is yellowish-brown, calcareous loam and has grayish-brown mottles.

Permeability is slow in these soils, and available water capacity is high. Runoff is very slow to ponded. The water table is seasonally high.

Representative profile of Brookston silty clay loam in a cultivated field 100 feet north and 300 feet east of the southwest corner of sec. 30, T. 16 N., R. 1 E.:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silty clay loam; moderate, medium, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary.

A12—8 to 17 inches, black (10YR 2/1) silty clay loam; moderate, fine, subangular blocky structure; friable; many fine roots; neutral; clear, wavy boundary.

B21tg—17 to 36 inches, gray (10YR 5/1) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/4 and 5/6) mottles; strong, medium, subangular blocky structure; firm; thin dark grayish-brown (10YR 4/2) clay films on faces of peds and as linings in some voids; few fine roots; few small pebbles; neutral; clear, wavy boundary.

IIB22tg—36 to 42 inches, dark-gray (10YR 4/1) clay loam; common, fine, distinct, yellowish-brown (10YR 5/6 and 5/8) and dark yellowish-brown (10YR 4/4) mottles; moderate, coarse, subangular blocky structure; firm; moderately thick dark-gray (10YR 4/1) clay films on faces of peds and as linings in some voids; few fine roots; few small pebbles; neutral; clear, wavy boundary.

IIB3—42 to 50 inches, dark-gray (10YR 4/1) clay loam; common, medium, distinct, yellowish-brown (10YR 5/6 and 5/8) and dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; firm; few small pebbles; neutral; clear wavy boundary.

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[1] Italic numbers in parentheses refer to Literature Cited, p. 66.

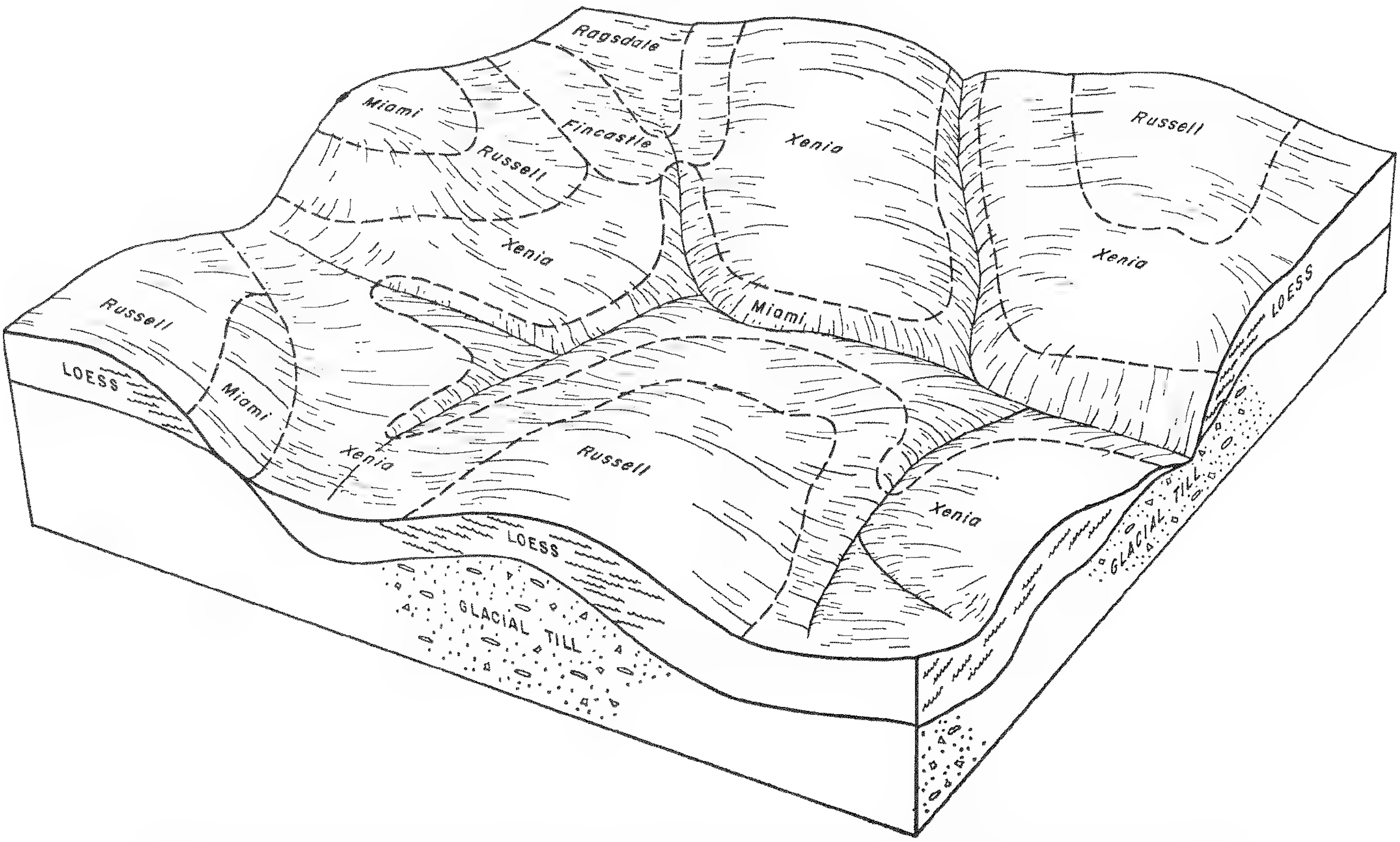

Figure 8.—**General pattern of soils, topography, and underlying material in the Xenia-Russell-Miami association.**

IIC –50 to 60 inches, yellowish-brown (10YR 5/4) loam; common, medium, faint, grayish-brown (10YR 5/2) mottles; massive; friable; many medium pebbles; moderately alkaline; calcareous.

The A horizon ranges from 11 to 18 inches in thickness and from black (10YR 2/1) to very dark grayish brown (10YR 3/2) in color. In the B horizon the dominant colors have hues of 10YR to 5Y, the value ranges from 4 to 6, and the chroma is 1 or 2. Mottles are 10YR or 7.5YR in hue and range from 4 to 6 in value and from 1 to 8 in chroma. The upper part of the B horizon is about 27 percent clay but ranges to 35 percent and is more than 15 percent fine or coarse sand. The C horizon ranges from 10YR to 2.5Y in hue, 5 to 7 in value, and 1 to 4 in chroma. It is dominantly loam but ranges from light clay loam to silt loam. The solum ranges from 26 to 50 inches in thickness.

Brookston soils are similar to Ragsdale, Rensselaer, and Mahalasville, clayer subsoil variant, soils. Brookston soils have more sand in the subsoil than Mahalasville and Ragsdale soils. They have less sand and gravel in the subsoil and in the substratum than Rensselaer soils.

Brookston silt loam, overwash (0 to 2 percent slopes) (Br).—Some areas of this soil are in depressions at the base of gentle to moderately steep slopes, and some are in drainageways. The adjoining gently sloping to moderately steep soils are eroded to severely eroded. The profile is similar to the one described as representative of the series, but the original surface layer has been covered with 10 to 20 inches of silty material washed down from the adjoining slopes.

Included with this soil in mapping were soils that have a dark-gray or dark grayish-brown surface layer.

Content of organic matter is moderate in this soil. Wetness is the main limitation that affects use and management.

This Brookston soil is easy to cultivate. If it is adequately drained, this soil is suited to all crops commonly grown in the county. Under proper management it can be used intensively for row crops. Its limitations for uses associated with residential development are severe. Capability unit IIw–1; tree and shrub suitability group 1.

Brookston silty clay loam (0 to 2 percent slopes) (Bs).—Some of this soil is in large tracts within which are irregularly shaped islandlike areas of lighter colored soils, and some of it is in drainageways and small depressions surrounded by lighter colored soils. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Crosby soils. Also included were areas, near the center of large tracts of this soil, where the subsoil is less sandy than that of this soil. Small wet spots and spots of muck were also included. They are indicated on the detailed soil map by special symbols.

The content of organic matter is high in this soil. Wetness is the main limitation that affects use and management (fig. 9).

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Brookston silt loam, overwash	550	0. 2
Brookston silty clay loam	58, 500	21. 9
Crosby silt loam, 0 to 3 percent slopes	83, 100	31. 2
Crosby-Miami silt loams, 2 to 6 percent slopes, eroded	10, 300	3. 9
Fincastle silt loam, 0 to 3 percent slopes	18, 450	6. 9
Fox loam, 0 to 2 percent slopes	520	. 2
Fox loam, 2 to 6 percent slopes, eroded	650	. 3
Fox loam, 6 to 12 percent slopes, eroded	317	. 1
Fox clay loam, 6 to 12 percent slopes, severely eroded	550	. 2
Genesee silt loam	12, 600	4. 8
Genesee sandy loam, sandy variant	189	(1)
Hennepin loam, 25 to 50 percent slopes	4, 450	1. 7
Mahalasville silty clay loam, clayey subsoil variant	300	. 1
Martinsville loam, 0 to 2 percent slopes	1, 450	. 5
Martinsville loam, 2 to 6 percent slopes, eroded	1, 450	. 5
Miami silt loam, 2 to 6 percent slopes, eroded	19, 000	7. 1
Miami silt loam, 6 to 12 percent slopes, eroded	6, 200	2. 3
Miami silt loam, 12 to 18 percent slopes, eroded	2, 150	. 8
Miami silt loam, 18 to 25 percent slopes, eroded	1, 150	. 4
Miami clay loam, 2 to 6 percent slopes, severely eroded	1, 100	. 4
Miami clay loam, 6 to 12 percent slopes, severely eroded	6, 300	2. 4
Miami clay loam, 12 to 18 percent slopes, severely eroded	700	. 3
Ockley silt loam 0 to 2 percent slopes	3, 000	1. 1
Ockley silt loam, 2 to 6 percent slopes, eroded	430	. 2
Ockley silt loam, loamy substratum, 0 to 2 percent slopes	850	. 3
Ockley silt loam, loamy substratum, 2 to 6 percent slopes, eroded	220	(1)
Ragsdale silty clay loam	5, 100	1. 9
Rensselaer clay loam	8, 400	3. 2
Russell silt loam, 2 to 6 percent slopes, eroded	2, 300	. 9
Russell silt loam, 6 to 12 percent slopes, eroded	480	. 2
Shoals silt loam	8, 300	3. 1
Whitaker silt loam	4, 050	1. 5
Xenia silt loam, 0 to 2 percent slopes	324	. 1
Xenia silt loam, 2 to 6 percent slopes, eroded	3, 450	1. 3
Total	266, 880	100. 0

[1] Less than 0.05 percent.

If this Brookston soil is adequately drained, it is suited to all crops commonly grown in the county. Under proper management it can be used intensively for row crops. Its limitations for uses associated with residential development are severe. Capability unit IIw–1; tree and shrub suitability group 1.

Crosby Series

The Crosby series consists of deep, somewhat poorly drained, nearly level and gently sloping soils on uplands. These soils formed in loamy glacial till covered, in places, by a layer of loess as much as 20 inches thick. The native vegetation consisted of water-tolerant hardwoods.

In a representative profile the surface layer is about 10 inches thick and consists of dark grayish-brown silt loam. The subsurface layer is about 4 inches thick and consists of light grayish-brown silt loam. The subsoil is about 23 inches thick and has grayish-brown and light brownish-gray mottles. The upper 3 inches is yellowish-brown heavy silt loam; the next 16 inches is yellowish-brown clay loam; and the lower 4 inches is brown, yellowish-brown, and gray loam. The substratum, at a depth of 37 inches, is yellowish-brown, brown, and gray, mottled loam.

Permeability is slow in these soils, and available water capacity is high. The content of organic matter is moderate, and the water table is seasonally high.

Representative profile of Crosby silt loam, 0 to 3 percent slopes, in a cultivated field 1,300 feet south and 225 feet east of the northwest corner of the NW¼ sec. 23, T. 15 N., R. 1 W.:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; common iron and manganese oxide concretions; neutral; abrupt, smooth boundary.

A2g—10 to 14 inches, light brownish-gray (10YR 6/2) silt loam; few, fine, distinct yellowish-brown (10YR 5/6) mottles; moderate, medium, platy structure; friable; medium acid; abrupt, smooth boundary.

B1—14 to 17 inches, yellowish-brown (10YR 5/4) heavy silt loam; common, fine, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; friable; few black (10YR 2/1) manganese and iron oxide concretions; strongly acid; clear, wavy boundary.

IIB21tg—17 to 24 inches, yellowish-brown (10YR 5/6) clay loam; many, medium, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular and angular blocky structure; firm; thin gray (10YR 5/1) clay films on faces of all peds; common black (10YR 2/1) manganese and iron oxide concretions; slightly acid; gradual, wavy boundary.

IIB22t 24 to 33 inches, yellowish brown (10YR 5/4) clay loam; common, medium, distinct, grayish-brown (10YR 5/2) mottles; moderate, coarse, subangular and angular blocky structure; firm; dark-grayish brown (10YR 4/2) clay films on faces of most peds; common very dark brown (10YR 2/2) manganese and iron oxide concretions; common pebbles; slightly acid; clear, irregular boundary.

IIB3t—33 to 37 inches, mottled, brown (10YR 5/3), yellowish-brown (10YR 5/6), and gray (10YR 6/1) loam; weak, coarse, prismatic structure that parts to weak, coarse, subangular blocky; firm; thick dark grayish-brown (10YR 4/2) clay films on faces of peds; few pebbles; mildly alkaline; clear, irregular boundary.

IIC—37 to 60 inches, mottled, yellowish-brown (10YR 5/6), brown (10YR 5/3). and gray (10YR 6/1) loam; massive; firm; moderately alkaline; calcareous.

The A horizon ranges from 8 to 17 inches in thickness and from dark gray (10YR 4/1) to grayish brown (10YR 5/2) in color. The B horizon is yellowish-brown (10YR 5/4), brown (10YR 5/3), and grayish brown (10YR 5/2). Mottles are 2.5Y in hue, 5 or 6 in value, and range from 1 to 8 in chroma. The B2 horizon commonly is clay loam but in places is silty clay loam in the upper part. The C horizon is commonly calcareous loam till, but it ranges from silt loam to sandy loam. The solum ranges from 24 to 42 inches in thickness, and the loess deposit ranges from 0 to 20 inches in thickness.

Crosby soils are similar to Fincastle and Whitaker soils. Crosby soils have more sand in the upper part of the subsoil and are shallower over glacial till than Fincastle soils. Crosby soils lack the stratified subsoil and stratified substratum that are characteristic of Whitaker soils.

Crosby silt loam, 0 to 3 percent slopes (CrA).—This soil is in large continuous areas or small to large islandlike areas that are intermingled with or surrounded by poorly drained soils. The areas are commonly 10 to 40

Figure 9.—**Ponded water after a rain in a depression on Brookston silty clay loam.**

acres in size and are irregular in shape. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Brookston, Fincastle, and Miami soils that are less than 2 acres in size. Also included were small areas of Hennepin soils that are indicated on the detailed soil map by the symbol for escarpment.

Permeability is slow in this soil. Runoff is slow. Where slopes are over 2 percent, erosion is a hazard. Wetness is the main limitation in use and management.

If this Crosby soil is drained, it is suited to all crops commonly grown in the county. Under proper management it can be used intensively for row crops. Capability unit IIw–2; tree and shrub suitability group 2.

Crosby-Miami silt loams, 2 to 6 percent slopes, eroded (CsB2).—This complex is on knolls. The areas are irregular in shape, and most are between 10 and 30 acres in size. About 65 percent of the acreage is Crosby silt loam, and about 35 percent is Miami silt loam. The Miami soil is browner and better drained than the Crosby soil. The Crosby soil and Miami soil in this complex have profiles similar to those described as representative of their respective series. In most cultivated areas, moderate amounts of brownish subsoil are mixed with the material originally in the surface layer.

Included with these soils in mapping were a few small areas of Brookston soils. Also included were areas that are only slightly eroded.

Permeability is slow in Crosby silt loam and moderate in Miami silt loam. Runoff is medium on both of these soils. Erosion is a hazard in use and management of these soils, and wetness is a limitation in Crosby silt loam.

The soils of this complex are suited to all crops commonly grown in the county. Under careful management that includes practices to help to control further erosion, it can be used intensively for row crops. Capability unit IIe–12; tree and shrub suitability group 2.

Fincastle Series

The Fincastle series consists of deep, somewhat poorly drained, nearly level and gently sloping soils on uplands. These soils formed in 20 to 40 inches of loess and underlying material weathered from loamy glacial till. The native vegetation consisted of water-tolerant hardwoods.

In a representative profile the surface layer is about 9 inches thick and consists of dark grayish-brown silt loam. The subsoil is about 43 inches thick and has light brownish-gray, yellowish-brown, gray, and grayish-brown mottles. The upper 20 inches is brown, yellowish-brown, and grayish-brown silty clay loam. The lower 23 inches is yellowish-brown clay loam and heavy loam. The substratum, at a depth of 52 inches, is brown loam and has gray mottles.

Permeability is slow in these soils, and available water capacity is high. The content of organic matter is moderate, and the water table is seasonally high.

Representative profile of Fincastle silt loam, 0 to 3 percent slopes, in a cultivated field 250 feet south and 700 feet west of the northeast corner of the NW¼ sec. 10, T. 15 N., R. 2 W.:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; common black (10YR 2/1) manganese and iron oxide concretions; slightly acid; abrupt, smooth boundary.

B1t—9 to 12 inches, brown (10YR 5/3) silty clay loam; many, coarse, distinct, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; few, thin, light brownish-gray (10YR 6/2) clay films on faces of some peds, and thin light-gray (10YR 7/1) silt coatings on faces of many peds; few black (10YR 2/1) manganese and iron oxide concretions; strongly acid; clear, wavy boundary.

B21t—12 to 20 inches, yellowish-brown (10YR 5/4) silty clay loam; many, coarse, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; firm; thin, discontinuous, light brownish-gray (10YR 6/2) clay films on faces of some peds, and thin light-gray (10YR 7/1) silt coatings on faces of many peds; common black (10YR 2/1) manganese and iron oxide concretions; strongly acid; gradual, wavy boundary.

B22t—20 to 29 inches, grayish-brown (10YR 5/2) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; medium gray (10YR 5/1) clay films on faces of most peds; common black (10YR 2/1) manganese and iron oxide concretions; strongly acid; gradual, wavy boundary.

IIB23t—29 to 42 inches, yellowish-brown (10YR 5/4) clay loam; many, medium, distinct, gray (10YR 5/1) mottles; weak, coarse, prismatic structure that parts to weak, coarse, subangular blocky; friable; medium gray (10YR 5/1) clay films on faces of peds; few pebbles; neutral; gradual, irregular boundary.

IIB3—42 to 52 inches, yellowish-brown (10YR 5/4) heavy loam; many, coarse, distinct, grayish-brown (10YR 5/2) mottles; weak, coarse, prismatic structure; friable; medium gray (10YR 6/1) clay films on faces of peds; few pebbles; mildly alkaline; gradual, irregular boundary.

IIC—52 to 68 inches, brown (10YR 5/3) loam; common, medium, distinct, gray (10YR 6/1) mottles; massive; firm; few pebbles; moderately alkaline; calcareous.

The A horizon ranges from 8 to 12 inches in thickness. It ranges from light brownish gray (10YR 6/2) to dark grayish brown (10YR 4/2). In the B horizon hue is 10YR, value ranges from 4 to 6, and the chroma ranges from 1 to 4. The C horizon is generally calcareous loam till, but it ranges from silt to sandy loam. The solum ranges from 36 to 70 inches in thickness.

Fincastle soils are similar to Crosby and Whitaker soils. Fincastle soils have less sand in the upper part of the subsoil than these soils. They are deeper over glacial till than Crosby soils. Fincastle soils lack the stratified subsoil and stratified substratum that are characteristic of Whitaker soils, and their subsoil is grayer than that of Whitaker soils.

Fincastle silt loam, 0 to 3 percent slopes (FcA).—This soil is in large, continuous areas or small-to-large island-like areas that are intermingled with or surrounded by very poorly drained soils. The areas are 10 to 40 acres in size and are irregular in shape.

Included with this soil in mapping were a few small areas of Crosby, Ragsdale, and Xenia soils that are less than 2 acres in size. Also included were a few areas where the loess deposit is more than 40 inches thick and a few areas, near Ragsdale silty clay loam, that have a dark-gray surface layer.

Runoff is slow on this soil. Where slopes are more than 2 percent, erosion is a hazard. Wetness is the main limitation that affects use and management.

Most areas of this Fincastle soil are cultivated. If this soil is adequately drained, it is suited to all crops commonly grown in the county. Under proper management it can be used intensively for row crops. Capability unit IIw-2; tree and shrub suitability group 2.

Fox Series

The Fox series consists of well-drained, nearly level to moderately sloping soils on outwash plains. These soils formed in glacial outwash material, and they are moderately deep over sand and gravel. The native vegetation consisted of hardwoods.

In a representative profile the surface layer is about 14 inches of dark-brown loam (fig. 10). The subsoil is about 17 inches thick. The upper 15 inches is brown and dark yellowish-brown clay loam. The lower 2 inches is

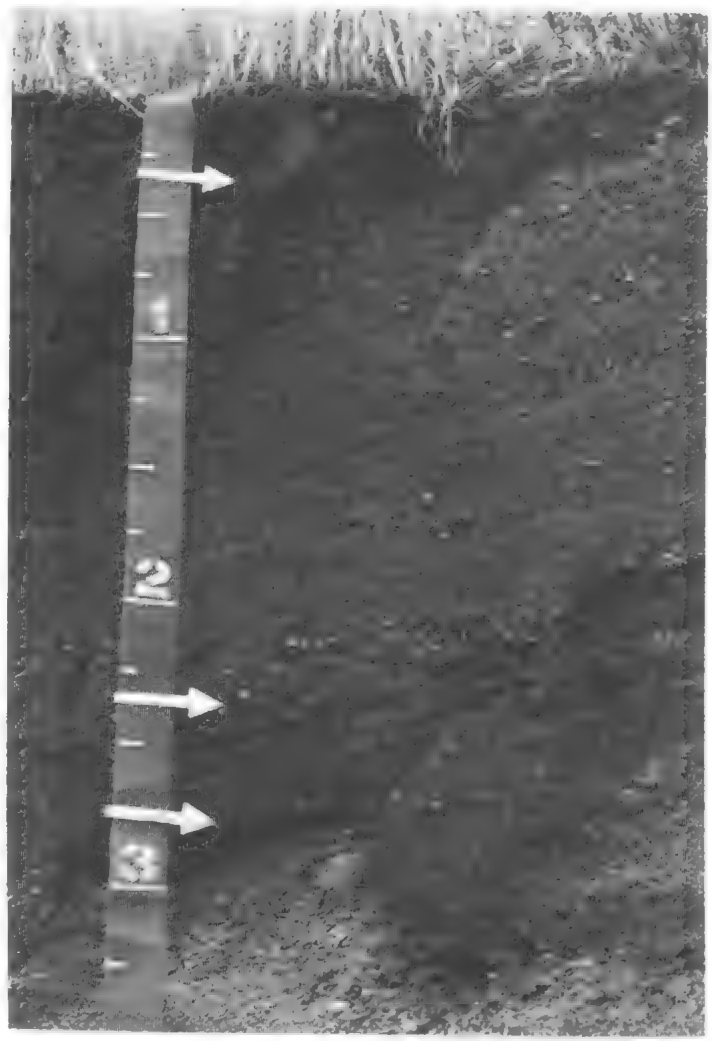

Figure 10.—Profile of a Fox loam.

dark-brown gravelly clay loam. The substratum, at a depth of 31 inches, is stratified yellowish-brown sand and gravel.

Permeability and available water capacity are moderate in these soils. The effective rooting depth is about 3 feet.

Representative profile of Fox loam, 0 to 2 percent slopes, in a cultivated field 675 feet south and 45 feet east of the northwest corner of the SE¼ sec. 22, T. 14 N., R. 1 E.:

- Ap—0 to 8 inches, dark-brown (10YR 4/3) loam; moderate, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.
- A2—8 to 14 inches, dark-brown (10YR 4/3) loam; moderate, medium, granular structure; friable; slightly acid; clear, wavy boundary.
- B1t—14 to 21 inches, brown (10YR 4/3) clay loam; weak, fine, subangular blocky structure; firm; few, thin, dark-brown (10YR 3/3) clay films on faces of peds; medium acid; clear, wavy boundary.
- B2t 21 to 29 inches, dark yellowish-brown (10YR 4/4) clay loam; weak, coarse, prismatic structure that parts to moderate, coarse, subangular blocky; firm; thin dark-brown (7.5YR 4/4) clay films on faces of peds and around small pebbles; 10 to 15 percent gravel; dark-brown (10YR 4/3) organic stains along root channels on faces of peds; medium acid; clear, wavy boundary.
- B3t—29 to 31 inches, dark-brown (7.5YR 4/4) gravelly clay loam; moderate, coarse, subangular blocky structure; friable; medium clay films on faces of peds; dark yellowish-brown (10YR 3/4) organic stains along root channels on faces of peds; neutral; abrupt, irregular boundary.
- IIC—31 to 60 inches, yellowish-brown (10YR 5/4) weakly stratified sand and gravel; single grained; loose; moderately alkaline; calcareous.

The A horizon ranges from 6 to 15 inches in thickness and from dark brown (10YR 4/3) to dark grayish brown (10YR 4/2) or brown (10YR 5/3) in color. The B horizon ranges from 16 to 25 inches in thickness. In this horizon dominant colors have a hue of 10YR, 7.5YR, or 5YR, a value of 3 or 4, and a chroma of 3 or 4. The B horizon ranges from loam to gravelly clay loam or sandy clay loam. In most places tongues of the B3t horizon extend several inches into the C horizon. The solum ranges from 24 to 40 inches in thickness.

Fox soils are similar to Martinsville and Ockley soils. They have more sand and gravel in the subsoil and in the substratum than Martinsville soils, and they are shallower over sand and gravel than Ockley soils

Fox loam, 0 to 2 percent slopes (FoA).—This soil is in areas adjacent to and at slightly higher elevation than soils on the bottom lands and on crowns of small hills and knolls. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Ockley soils. Also included were areas where the surface layer is silt loam or sandy loam. Areas where the surface layer has a high content of sand are indicated on the detailed soil map by the symbol for sand spots.

Runoff is slow on this soil, and content of organic matter is moderate. Droughtiness is the main limitation to use and management. Root growth is favorable to a depth of about 3 feet.

This Fox soil is suited to corn, soybeans, oats, and wheat. It can also be used for permanent pasture and trees. Capability unit IIs–1; tree and shrub suitability group 3.

Fox loam, 2 to 6 percent slopes, eroded (FoB2).—Areas of this soil are between soils on the bottom lands and nearly level Fox and Ockley soils at higher elevation. They are also on small knolls and kames that are surrounded by soils of the uplands. The profile is similar to the one described as representative of the series, but in most areas moderate amounts of brownish subsoil are mixed with the material originally in the surface layer. Slopes are less than 200 feet long.

Included with this soil in mapping were small areas that are severely eroded. Also included were small areas of Ockley soils and areas where the surface layer is silt loam or sandy loam. Areas where the surface layer has a high content of sand are indicated on the detailed soil map by the symbol for sand spots.

Runoff is medium on this soil, and content of organic matter is moderate. Droughtiness and the hazard of erosion are limitations that affect use and management. Root growth is favorable above the sand and gravel, which are at a depth of about 3 feet.

This Fox soil is suited to corn, soybeans, oats, and wheat. It can also be used for permanent pasture and trees. Capability unit IIe–9; tree and shrub suitability group 3.

Fox loam, 6 to 12 percent slopes, eroded (FoC2).—This soil is in narrow bands between soils on the bottom lands and soils at higher elevation on outwash plains. It is also on the sides of natural drainageways. The profile is similar to the one described as representative of the series, but in most areas moderate amounts of brownish subsoil are mixed with the material originally in the surface layer. Slopes are less than 200 feet long.

Included with this soil in mapping were small areas that are severely eroded and small areas of Ockley soils. Also included were areas of soils that have slopes of more than 12 percent and areas where the surface layer is silt loam or sandy loam.

Runoff is medium on this soil, and content of organic matter is moderate. The hazard of erosion affects use and management. Moderate depth to sand and gravel and insufficient moisture cause this soil to be droughty and limit its use. Root growth is favorable to a depth of about 3 feet.

This Fox soil is suited to hay, pasture, and trees. It can also be used for corn, soybeans, oats, and wheat. Capability unit IIIe–9; tree and shrub suitability group 3.

Fox clay loam, 6 to 12 percent slopes, severely eroded (FxC3).—This soil is in narrow bands between soils on the bottom lands and soils at higher elevation on the outwash plains. Its profile is similar to the one described as representative of the series, except the surface layer is thinner and less friable, the subsoil is thinner, and the depth to loose gravel and sand ranges from 24 to 30 inches. Slopes are less than 200 feet long.

Included with this soil in mapping were small areas of Fox soils that are not so eroded as this soil. Also included were small areas of Ockley soils and areas where the surface layer is loam or gravelly clay loam.

Runoff is rapid on this soil, and content of organic matter is low. The hazard of erosison affects use and management. Moderate depth to sand and gravel and insufficient moisture cause this soil to be droughty and limit its use. Root growth is favorable to a depth of about 3 feet.

This Fox soil is not suited to row crops, but it can be used for hay, pasture, and trees. Capability unit IVe-9; tree and shrub suitability group 3.

Genesee Series

The Genesee series consists of deep, well-drained, nearly level soils on bottom lands. These soils formed in loamy sediment deposited by floods. The native vegetation was hardwoods. Most areas of these soils are cultivated.

In a representative profile the surface layer is about 11 inches of dark grayish-brown silt loam. The subsoil is about 21 inches thick. The upper 10 inches is dark grayish-brown silt loam, and the lower 11 inches is dark-brown loam. The substratum, at a depth of 32 inches, is stratified yellowish-brown sandy loam and loam.

Permeability is moderate in these soils, and available water capacity is high. The content of organic matter is moderate, and runoff is slow.

Representative profile of Genesee silt loam in a cultivated field 325 feet south and 250 feet west of the northeast corner of the SW¼ sec. 10, T. 14 N., R. 2 W.:

Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) silt loam, dark brown (10YR 4/3) when crushed; moderate, fine, granular structure; friable; mildly alkaline; abrupt, smooth boundary.

B2—11 to 21 inches, dark grayish-brown (10YR 4/2) silt loam, dark brown (10YR 4/3) when crushed; weak, fine and medium, subangular blocky structure; friable; mildly alkaline; gradual, wavy boundary.

B3—21 to 32 inches, dark-brown (10YR 4/3) loam, yellowish brown (10YR 5/4) when crushed; weak, medium and coarse, subangular blocky structure; friable; mildly alkaline; clear, wavy boundary.

C—32 to 60 inches, yellowish-brown (10YR 5/4) stratified sandy loam and loam; massive; very friable; moderately alkaline; calcareous.

The Ap horizon ranges from 8 to 12 inches in thickness and from brown (10YR 5/3) to dark grayish brown (10YR 4/2) or dark brown (10YR 4/3) in color. In the B horizon dominant colors have a hue of 10YR, a value of 4 to 6, and a chroma of 2 to 4. The B horizon is silt loam or loam but ranges to light silty clay loam, clay loam, or sandy loam. In the C horizon, color has a hue of 10YR, a value of 4 to 6, and a chroma of 3 or 4. The horizons often become coarser as depth increases and are mildly to moderately alkaline and calcareous. The solum ranges from 30 to 40 inches in thickness.

Genesee soils are similar to Shoals soils and to Genesee, sandy variant, soils. They are not so gray as Shoals soils, and they have less sand throughout the profile than Genesee, sandy variant, soils.

Genesee silt loam (0 to 2 percent slopes) (Gn). This soil is in large tracts on the bottom lands adjacent to streams. Areas are generally 2 or 3 times as long as they are wide and are dissected by streams.

Included with this soil in mapping were small areas where the surface layer is loam or sandy loam, areas where the surface layer is very dark grayish brown, and areas where the surface layer is calcareous. Also included were some small areas of Genesee sandy loam, sandy variant. Wet soils that commonly are on the narrow bottom lands were also included. These wet soils lack carbonates above a depth of 40 inches. Areas where the surface layer has a high content of sand are indicated on the detailed soil map by the symbol for sand spots.

Flooding is a hazard in use and management of this soil.

This Genesee soil is suited to corn, soybeans, and other row crops commonly grown in the county. Under proper management it can be used intensively for row crops. Areas dissected by meandering streams and impractical to cultivate are suited to permanent pasture and trees. Small areas can be used for wildlife habitat. This soil has severe limitations for uses commonly associated with residential development. Capability unit I-2; tree and shrub suitability group 3.

Genesee Series, Sandy Variant

The Genesee series, sandy variant, consists of deep, well-drained, nearly level soils on the bottom lands adjacent to major streams. These soils formed in sandy and loamy sediment deposited by floods. The native vegetation consisted of hardwoods.

In a representative profile the surface layer is about 7 inches of dark yellowish-brown sandy loam, and the subsoil is about 18 inches of dark-brown sandy loam. The substratum, at a depth of 25 inches, is brown sand.

Permeability is moderately rapid in these soils, and runoff is slow. Available water capacity and content of organic matter are moderate.

Representative profile of Genesee sandy loam, sandy variant, in a cultivated field 350 feet south and 450 feet west of the northeast corner of the SE¼ sec. 22, T. 15 N., R. 1 W.:

Ap—0 to 7 inches, dark yellowish-brown (10YR 3/4) sandy loam; weak, fine, granular structure; very friable; neutral; abrupt, smooth boundary.

B—7 to 25 inches, dark-brown (10YR 4/3) sandy loam; weak, fine, granular structure; very friable; neutral; abrupt, wavy boundary.

C—25 to 60 inches, brown (10YR 5/3) medium sand, single grained; loose; mildly alkaline.

The Ap horizon ranges from 6 to 10 inches in thickness and from brown (10YR 5/3) to dark grayish brown (10YR 4/2), dark brown (10YR 4/3), or dark yellowish brown (10YR 3/4) in color. In the B horizon dominant colors have a hue of 10YR, a value of 4 to 6, and a chroma of 2 to 4. The B horizon is sandy loam or fine sandy loam. In the C horizon, dominant colors have a hue of 10YR, a value of 4 or 5, and a chroma of 3 or more. Material often becomes coarser in texture as depth increases and is mildly alkaline to moderately alkaline and calcareous. The solum ranges from 20 to 30 inches in thickness.

Genesee soils, sandy variant, are similar to Genesee and Shoals soils. Genesee soils, sandy variant, have more sand throughout the profile than Genesee soils, and they are not so gray as Shoals soils.

Genesee sandy loam, sandy variant (0 to 2 percent slopes) (Gs).—This soil is on bottom lands and near bends in larger streams. In cultivated areas the surface layer is dark yellowish brown.

Included with this soil in mapping were a few areas where the surface layer is coarse sand 10 to 15 inches thick. Areas where the surface layer has a high content of sand or gravel are indicated on the detailed soil map by sand spot or gravel symbols.

The hazard of flooding and droughtiness limits use and management, but this Genesee soil is easy to cultivate. It is suited to corn, soybeans, and other row crops commonly

grown in the county. Under proper management this soil can be used intensively for row crops. Areas dissected by meandering streams are impractical to cultivate and are suited to permanent pasture and trees. Small areas can be used as wildlife habitat. Limitations for uses commonly associated with residential development are severe. Capability unit I–2; tree and shrub suitability group 3.

Hennepin Series

The Hennepin series consists of deep, well-drained, steep and very steep soils on uplands. These soils formed in loamy glacial till. The native vegetation was hardwoods.

In a representative profile the surface layer is about 4 inches of dark-brown loam, and the subsoil is about 10 inches of brown loam. The substratum, at a depth of 14 inches, is brown loam.

Permeability is moderate in these soils, and available water capacity is high. Content of organic matter is moderate, and runoff is very rapid.

Representative profile of Hennepin loam, 25 to 50 percent slopes, in a wooded area 75 feet north and 600 feet west of the southeast corner of the SW¼ sec. 33, T. 16 N., R. 1 E.:

A—0 to 4 inches, dark-brown (10YR 3/3) loam; moderate, medium, granular structure; very friable; few pebbles; neutral; clear, wavy boundary.

B—4 to 14 inches, brown (10YR 4/3) loam; weak, fine, subangular blocky structure; friable; thin dark-brown (10YR 3/3) coatings on faces of peds; few pebbles; neutral; clear, wavy boundary.

C—14 to 60 inches, brown (10YR 5/3) loam; massive; friable; thin yellowish-red (5YR 4/6) iron stains and thin very dark grayish-brown (10YR 3/2) organic stains in root channels; few pebbles; moderately alkaline; calcareous.

The A horizon ranges from 4 to 6 inches in thickness and from brown (10YR 5/3) to dark grayish brown (10YR 4/2) or dark brown (10YR 3/3) in color. In the B horizon dominant colors have a hue of 10YR, a value of 4 to 6, and a chroma of 3 or 4. The B horizon is generally 20 to 27 percent clay but ranges from 18 to 35 percent. It is 15 to 50 percent sand. In the C horizon colors have a hue of 10YR, a value of 4 to 6, and a chroma of 3 or 4. The C horizon is generally loam but in places is sandy loam, clay loam, or silt loam. The solum ranges from 12 to 20 inches in thickness.

Hennepin soils are similar to Miami soils. Hennepin soils have more sand in the subsoil and lack the silty upper mantle of Miami soils.

Hennepin loam, 25 to 50 percent slopes (HeF).—Most areas of this soil are on steep breaks between bottom lands and uplands. In places, however, areas are on long, narrow back slopes of the uplands and on sides of deep drainageways.

Included with this soil in mapping were small areas of Miami soils and areas where the surface layer is silt loam. Areas of soils that have slopes of more than 50 percent are indicated on the detailed soil map by the symbol for an escarpment.

This Hennepin soil is not suited to row crops, but it can be used for permanent pasture or trees. Erosion is the main hazard in the use and management of this soil. Small areas can be used as wildlife habitat. Capability unit VIIe–2; tree and shrub suitability group 4.

Mahalasville Series, Clayey Subsoil Variant

The Mahalasville series, clayey subsoil variant, consists of deep, very poorly drained, nearly level soils in depressions in old glacial lakebeds. These soils formed in water-laid silt and clay. The native vegetation was water-tolerant hardwoods and marsh grasses.

In a representative profile the surface layer is about 15 inches of very dark gray and black silty clay loam. The subsoil is about 37 inches thick and has dark-brown and yellowish-red mottles. It is dark-gray light silty clay and gray silty clay. The substratum, at a depth of 52 inches, is gray stratified silty clay loam and silt loam and has reddish-brown and olive mottles.

Permeability is slow in these soils, and available water capacity is high. Runoff is very slow on nearly level soils, and water is ponded in depressions. Content of organic matter is high, and the water table is seasonally high.

Representative profile of Mahalasville silty clay loam, clayey subsoil variant (0 to 2 percent slopes) in a cultivated field 1,200 feet south and 330 feet west of the northeast corner of sec. 19, T. 16 N., R. 1 W.:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silty clay loam; weak, medium, granular structure; friable; neutral; abrupt, smooth boundary.

A1—8 to 15 inches, black (10YR 2/1) silty clay loam; strong, medium, angular blocky structure; firm; neutral; clear, wavy boundary.

B1g—15 to 28 inches, dark-gray (10YR 4/1) light silty clay; common, fine, distinct, dark-brown (7.5YR 3/2) mottles; moderate, medium, prismatic structure that parts to moderate, medium, subangular blocky; firm; neutral; abrupt, wavy boundary.

B2g—28 to 42 inches, dark-gray (5Y 4/1) light silty clay; common, medium, distinct, yellowish-red (5YR 4/6) and (5YR 5/6) mottles; moderate, medium, prismatic structure that parts to moderate, medium, subangular blocky; firm; neutral; clear, wavy boundary.

B3g—42 to 52 inches, gray (5Y 5/1) silty clay; many, medium, distinct, yellowish red (5YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; neutral; clear, wavy boundary.

C1g—52 to 66 inches, gray (5Y 5/1) silty clay loam; many, medium, distinct, reddish-brown (5YR 5/4) mottles; massive; firm; mildly alkaline; gradual, wavy boundary.

C2g—66 to 72 inches, gray (5Y 5/1) silt loam; many, medium, distinct, olive (5Y 5/4) mottles; massive; firm; moderately alkaline, calcareous.

The A horizon ranges from 12 to 16 inches in thickness and from black (10YR 2/1) to very dark grayish brown (10YR 3/2) in color. In the B horizon color has a hue of 10YR to 5Y, a value of 4 or 5, and a chroma of 1 or 2. Mottles have a hue of 10YR to 5Y, a value of 4 or 5, and a chroma of 4 to 6. The C horizon is stratified silt loam or silty clay loam. The solum ranges from 36 to 60 inches in thickness.

Mahalasville soils are similar to Brookston, Ragsdale, and Rensselaer soils. Mahalasville soils have less sand and more clay in the subsoil and in the substratum than Brookston, Ragsdale, and Rensselaer soils.

Mahalasville silty clay loam, clayey subsoil variant (0 to 2 percent slopes) (Mc).—This soil is in large tracts in old lakebeds.

Included with this soil in mapping were small areas of Whitaker soils. Also included were areas of soils that contain more sand in the subsoil than this soil.

Wetness is the main limitation to use and management of this soil.

If this Mahalasville soil is adequately drained, it is suited to all crops commonly grown in the county. Under proper management it can be used intensively for row crops. Limitations for uses commonly associated with residential developments are severe. Capability unit IIw–1; tree and shrub suitability group 1.

Martinsville Series

The Martinsville series consists of deep, well-drained, nearly level and gently sloping soils on outwash plains. These soils formed in sandy and loamy outwash material. Thin layers of stratified material are at a depth of about 3 feet. The native vegetation consisted of hardwoods.

In a representative profile the surface layer is about 8 inches thick and consists of dark grayish-brown loam. The subsurface layer is about 5 inches thick and consists of dark-brown loam. The subsoil is about 40 inches thick. It is dark yellowish-brown and dark-brown clay loam in the upper part and dark yellowish-brown sandy clay loam and sandy loam in the lower part. The substratum, at a depth of 53 inches, is brown, pale-brown, and dark yellowish-brown stratified silt, loam, sandy loam, and sand.

Permeability is moderate in these soils, and available water capacity is high. Content of organic matter is moderate.

Representative profile of Martinsville loam, 0 to 2 percent slopes, in a cultivated field 100 feet south and 600 feet west of the northeast corner of the SE¼ sec. 22, T. 16 N., R. 2 W.:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) loam; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.

A2—8 to 13 inches, dark-brown (10YR 4/3) loam; moderate, medium, granular structure; friable; neutral; clear, wavy boundary.

B1t—13 to 17 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, fine, subangular blocky structure; firm; thin dark-brown (10YR 3/3) clay films on faces of peds; slightly acid; clear, wavy boundary.

B21t—17 to 27 inches, dark-brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin dark-brown (10YR 3/3) clay films on faces of peds; strongly acid; gradual, wavy boundary.

B22t—27 to 35 inches, dark-brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin dark-brown (10YR 3/3) clay films on faces of peds; strongly acid; gradual, wavy boundary.

B23t—35 to 43 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; moderate, coarse, subangular blocky structure; friable; thin dark yellowish-brown (10YR 3/4) clay films on faces of peds; medium acid; clear, wavy boundary.

B3—43 to 53 inches, dark yellowish-brown (10YR 3/4) sandy loam; weak, coarse, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

C—53 to 60 inches, brown (10YR 5/3), pale-brown (10YR 6/3) and dark yellowish-brown (10YR 3/4) stratified silt, loam, sandy loam, and sand; massive; friable; moderately alkaline; calcareous.

The A horizon ranges from 10 to 14 inches in thickness and from dark brown (10YR 4/3) to dark grayish brown (10YR 4/2) or brown (10YR 5/3) in color. In the B2 horizon dominant colors have a hue of 10YR, 7.5YR, or 5YR, a value of 4 or 5, and a chroma of 3 or 4. The B horizon is generally clay loam but ranges from heavy loam to sandy clay loam or sandy loam. The upper 20 inches of the B horizon is more than 15 percent fine and coarse sand. In the C horizon color has a hue of 10YR, a value of 3 to 6, and a chroma of 3 or 4. The C horizon is generally stratified silt, loam, sandy loam, and sand and in places has thin layers of clay loam or silty clay loam. The solum ranges from 40 to 60 inches in thickness.

Martinsville soils are similar to Fox, Miami, and Ockley soils. Martinsville soils have less gravel in the subsoil than Fox and Ockley soils and have a thicker solum than Fox soils. They are stratified in the lower part of the subsoil, but the Miami soils are not.

Martinsville loam, 0 to 2 percent slopes (MeA).—This soil is adjacent to and at slightly higher elevation than soils on the bottom lands. In natural sluiceways small areas are adjacent to somewhat poorly drained and very poorly drained soils. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of soils that have a surface layer of silt loam. Also included were areas of soils on sharp breaks. The soils shallow to sand and silt are on the upper part of the breaks, and those shallow to till are on the lower part. The till is at a depth of 6 to 10 feet below the outwash material. Seepy springs are between the stratified material and the till. These areas are indicated on the detailed soil map by the symbol for an escarpment.

Runoff is slow on this soil. It has no limitations to use and management.

This Martinsville soil is easy to cultivate. It is suited to all crops commonly grown in the county. Under proper management this soil can be used intensively for row crops. Capability unit I–1; tree and shrub suitability group 3.

Martinsville loam, 2 to 6 percent slopes, eroded (MeB2).—This soil is between soils on the bottom lands and nearly level Martinsville and Whitaker soils at higher elevation and in small areas surrounded by somewhat poorly drained and very poorly drained soils. The profile is similar to that described as representative of the series, but in cultivated areas the surface layer is about 7 inches thick and is dark grayish brown or dark brown. Slopes are less than 300 feet long.

Included with this soil in mapping were areas where the surface layer is loam or fine sandy loam and a few areas of soils that have slopes greater than 6 percent. Also included were small areas where the soil is severely eroded.

Runoff is medium on this soil. Further erosion is a hazard in use and management.

This Martinsville soil is easy to cultivate. It is suited to all crops commonly grown in the county. Under careful management that includes practices to help control erosion, it can be used intensively for row crops. Capability unit IIe–3; tree and shrub suitability group 3.

Miami Series

The Miami series consists of deep, well-drained, gently sloping to moderately steep soils on uplands. These soils formed in as much as 18 inches of loess and underlying loamy glacial till. The native vegetation was hardwoods.

In a representative profile the surface layer is about 8 inches of dark-brown silt loam. The subsoil is about 28 inches thick. It is dark yellowish-brown silty clay loam and clay loam in the upper part and dark-brown loam in the lower part. The substratum, at a depth of 36 inches, is brown loam.

Permeability is moderate in these soils, and available water capacity is high.

Representative profile of Miami silt loam, 2 to 6 percent slopes, eroded, in a cultivated field 300 feet south and 800 feet west of the northeast corner of sec. 6, T. 15 N., R. 1 E.:

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

B1t—8 to 13 inches, dark yellowish-brown (10 YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thick dark-brown (7.5YR 4/4) clay films on faces of peds and as linings of some voids; medium acid; abrupt, wavy boundary.

IIB21t—13 to 23 inches, dark yellowish-brown (10YR 4/4) clay loam; strong, coarse, subangular blocky structure; firm; thin dark-brown (7.5YR 4/4) clay films on faces of peds and as linings of some voids; strongly acid; clear, wavy boundary.

IIB22t—23 to 31 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, coarse, subangular blocky structure; firm; thin dark-brown (7.5YR 4/4) clay films on faces of all peds and as linings of some voids; medium acid; clear, wavy boundary.

IIB3—31 to 36 inches, dark-brown (10YR 4/3) loam; weak, coarse, prismatic structure; friable; thin, discontinuous, dark-yellowish-brown (10YR 4/4) clay films on faces of peds; mildly alkaline; clear, irregular boundary.

IIC—36 to 60 inches, brown (10YR 5/3) loam; massive; firm; moderately alkaline; calcareous.

The A horizon ranges from 2 to 12 inches in thickness and from dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/4) or dark brown (10YR 4/3) in color. In the B horizon dominant colors have a hue of 10YR or 7.5YR, a value of 4 to 6, and a chroma of 3 to 6. The B horizon is generally clay loam but ranges from silty clay loam to loam. The C horizon is generally calcareous loam till but ranges from silt loam to sandy loam. The solum ranges from 24 to 42 inches in thickness, and the loess deposit ranges from 0 to 18 inches in thickness.

Miami soils are similar to Ockley, Martinsville, and Russell soils. Miami soils have less sand and gravel in the lower part of the subsoil and in the substratum than Ockley soils. They lack the stratification in the subsoil that is characteristic of Martinsville soils. Miami soils have more sand in the subsoil than Russell soils.

Miami silt loam, 2 to 6 percent slopes, eroded (MmB2).—This soil is in tracts between nearly level soils of the uplands and steeper soils adjacent to outwash plains and bottom lands. It also is on the sides of natural drainageways and in islandlike areas at slightly higher elevation that are surrounded by somewhat poorly drained soils. This soil has the profile described as representative of the series.

Included with this soil in mapping were a few areas where the surface layer is loam and a few areas where the soil is only slightly eroded. Also included were small areas of Hennepin soils that are indicated on the detailed soil map by the symbol for an escarpment.

Runoff is medium on this soil. Content of organic matter is moderate. Further erosion is a hazard in use and management.

This Miami soil is suited to all crops commonly grown in the county. Under careful management that includes practices to help to control erosion, it can be used intensively for row crops. Capability unit IIe-1; tree and shrub suitability group 3.

Miami silt loam, 6 to 12 percent slopes, eroded (MmC2).—This soil is between soils of the uplands and soils at lower elevation of the bottom lands. Also, areas are parallel to steeper soils adjacent to soils on the bottom lands and sides of natural drainageways. The profile is similar to the one described as representative of the series, but in cultivated areas the surface layer is brown to dark brown and is 6 to 8 inches thick. Also, moderate amounts of dark yellowish-brown subsoil are mixed with the material originally in the surface layer. Slopes are less than 300 feet long.

Included with this soil in mapping were a few areas that are only slightly eroded. Also included were small areas of Hennepin soils that are noted in the detailed soil map by the symbol for an escarpment.

Runoff is medium on this soil. Content of organic matter is moderate. Further erosion is a hazard in use and management.

This Miami soil is easy to cultivate. It is suited to all crops commonly grown in the county. It also can be used for hay, pasture, and trees; and in places it is suitable for ponds (fig. 11). Capability unit IIIe-1; tree and shrub suitability group 3.

Miami silt loam, 12 to 18 percent slopes, eroded (MmD2).—This soil is in areas between soils of the uplands and soils at lower elevation of the bottom lands. It also is on sides of natural drainageways. The profile is similar to the one described as representative of the series, but the surface layer and subsoil are thinner. Slopes are less than 300 feet long.

Included with this soil in mapping were areas where the soil is only slightly eroded. Also included were small areas of Hennepin soils that are indicated on the detailed soil map by the symbol for an escarpment.

Runoff is rapid on this soil. Content of organic matter is moderate. Erosion is a hazard in use and management.

This Miami soil is easy to cultivate. It is suited to hay, pasture, and trees. Under management that includes intensive water-control practices, it also can be used for all crops commonly grown in the county. Capability unit IVe-1; tree and shrub suitability group 3.

Miami silt loam, 18 to 25 percent slopes, eroded (MmE2).—This soil is in areas between soils of the uplands and soils at lower elevation of the bottom lands. In places it is dissected by short, steep drainageways. The profile is similar to the one described as representative of the series, but the surface layer and subsoil are thinner. Slopes are less than 300 feet long.

Included with this soil in mapping were some areas where the soil is only slightly eroded and a few areas where it is severely eroded. Also included were small areas of Hennepin soils.

Runoff is rapid on this soil. Content of organic matter is moderate. Further erosion is a hazard in use and management.

This Miami soil is not suited to row crops. It can be used for permanent pasture and trees. Capability unit VIe-1; tree and shrub suitability group 4.

Miami clay loam, 2 to 6 percent slopes, severely eroded (MsB3).—This soil is in areas between nearly level soils of the uplands and steeper soils adjacent to outwash plains and bottom lands. It also occupies the sides of natural drainageways. The profile is similar to the one described as representative of the series, but more than three-fourths of the surface layer is missing because of erosion, and in most areas the original surface layer and

Figure 11.—**Farm pond in an area of Miami silt loam, 6 to 12 percent slopes, eroded.**

part of the subsoil are missing. In most areas, pebbles and small stones are on the surface. Slopes are less than 300 feet long. Included in mapping were a few small areas where the soil is only moderately eroded.

Runoff is rapid on this soil. Content of organic matter is low. Further erosion is a hazard in use and management.

This Miami soil is difficult to cultivate. It is suited to hay, pasture, and trees. Under careful management that includes practices to help to control erosion, it also can be used for all crops commonly grown in the county. Capability unit IIIe–1; tree and shrub suitability group 3.

Miami clay loam, 6 to 12 percent slopes, severely eroded (MsC3).—This soil is in areas between soils of the uplands and soils at lower elevation of the bottom lands. It also is parallel to steeper soils that are adjacent to soils of the bottom lands and is on sides of natural drainageways. The profile is similar to the one described as representative of the series, but more than three-fourths of the surface layer is missing because of erosion, and in most areas the original surface layer and part of the subsoil are missing. In places the underlying calcareous glacial till is exposed. Slopes are less than 400 feet long.

Included with this soil in mapping were some areas where the depth to calcareous till is less than 24 inches. Also included were a few areas where slope is more than 12 percent.

Runoff is rapid on this soil. Content of organic matter is low. Further erosion is a hazard in use and management.

This Miami soil is difficult to cultivate. It is suited to hay, pasture, and trees. Under management that includes intensive water-control practices, it also can be used for all crops commonly grown in the county. Capability unit IVe–1; tree and shrub suitability group 3.

Miami clay loam, 12 to 18 percent slopes, severely eroded (MsD3).—This soil is in areas between soils of the uplands and soils at lower elevation of the bottom lands. It also occupies the sides of natural drainageways. The profile is similar to the one described as representative of the series, but the subsoil is thinner. More than three-fourths of the surface layer is missing because of erosion, and in most areas the surface layer and part of the subsoil are missing. In places the underlying calcareous glacial till is at the surface. In most areas pebbles and small stones are on the surface. Slopes are less than 300 feet long.

Included with this soil in mapping were areas where the depth to calcareous till is less than 24 inches. Also included were a few areas where slope is more than 18 percent.

Runoff is very rapid on this soil. Content of organic matter is low. Further erosion is a hazard in use and management.

This Miami soil is difficult to cultivate. It is not suited to row crops. It can be used for permanent pasture and trees. Capability unit VIe–1; tree and shrub suitability group 3.

Ockley Series

The Ockley series consists of deep, well-drained, nearly level and gently sloping soils on outwash plains. These soils formed mainly in loamy glacial outwash material over sand and gravel. In places a layer of loess as much as 24 inches thick covers the outwash material. The native vegetation consisted of hardwoods.

In a representative profile the surface layer is about 11 inches of dark-brown silt loam (fig. 12). The subsoil is about 37 inches thick. It is dark-brown heavy silt loam, silty clay loam, and clay loam in the upper part and reddish-brown sandy clay loam and dark-brown gravelly clay loam in the lower part. The substratum is brown sand and gravel.

Available water capacity is high in these soils. Permeability and content of organic matter are moderate.

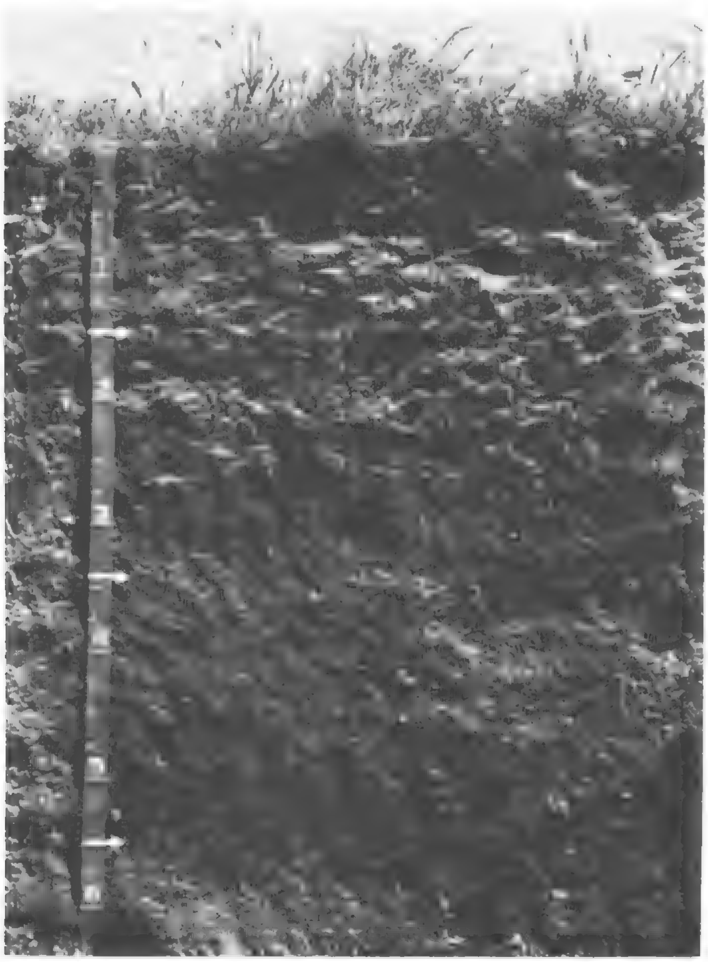

Figure 12.—Profile of an Ockley silt loam.

Representative profile of Ockley silt loam, 0 to 2 percent slopes, in a cultivated field 730 feet north and 490 feet west of the southeast corner of the SW¼ sec. 9, T. 16 N., R. 2 W.:

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—9 to 11 inches, dark-brown (10YR 4/3) silt loam, brown (10YR 5/3) when crushed; weak, thick, platy structure that parts to moderate, medium, granular; friable; neutral; clear, wavy boundary.

B1—11 to 14 inches, dark-brown (10YR 4/3) heavy silt loam, brown (10YR 5/3) when crushed; weak, medium, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

B21t—14 to 24 inches, dark-brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin dark-brown (7.5YR 4/4) clay films on faces of peds; medium acid; clear, wavy boundary.

IIB22t—24 to 34 inches, dark-brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin dark-brown (7.5YR 4/4) clay films on faces of peds; few pebbles; medium acid; clear, wavy boundary.

IIB23t—34 to 45 inches, reddish-brown (5YR 4/3) sandy clay loam; weak, coarse, subangular blocky structure; friable; thin reddish-brown (5YR 4/3) clay films on faces of some peds; few pebbles; medium acid; clear, wavy boundary.

IIB24t—45 to 48 inches, dark-brown (7.5YR 4/2) gravelly clay loam; weak, coarse, subangular blocky structure; friable; thin dark reddish-brown (5YR 3/2) clay films on faces of most peds; slightly acid; clear, irregular boundary.

IIIC—48 to 68 inches, brown (10YR 5/3) sand and gravel; single grained; loose; moderately alkaline, calcareous.

The A horizon ranges from 8 to 13 inches in thickness and from dark brown (10YR 4/3) to dark grayish brown (10YR 4/2) or brown (10YR 5/3) in color. In the B horizon the dominant colors have a hue of 10YR, 7.5YR, or 5YR, a value of 3 to 5, and a chroma of 3 or 4. Texture is commonly clay loam, but subhorizons range from heavy silt loam to sandy clay loam or gravelly clay loam. The lower part of the B horizon is 18 to 40 percent gravel, by volume. In the C horizon color has a hue of 10YR, a value of 4 or 5, and a chroma of 3 or 4. The solum ranges from 42 to 60 inches in thickness, and the loess deposit ranges from 0 to 24 inches in thickness.

Ockley soils are similar to Fox, Martinsville, and Miami soils. Ockley soils are deeper over sand and gravel than Fox soils. They have more gravel in the subsoil and in the substratum than Martinsville and Miami soils.

Ockley silt loam, 0 to 2 percent slopes (OcA).—This soil occupies areas adjacent to and at slightly higher elevation than soils on the bottom lands. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of soils on sharp breaks. The soils shallow to sand and gravel are on the upper part of the breaks, and those that are shallow to till are on the lower part. The till is at a depth of 6 to 10 feet. These areas are indicated on the detailed soil map by the symbol for escarpment. Also included were areas that have a surface layer of loam and a few areas of soils that have slopes greater than 2 percent.

Runoff is slow on this soil. This soil has no limitations to use and management.

This Ockley soil is easy to cultivate. It is suited to all crops commonly grown in the county. Under proper man-

agement it can be used intensively for row crops. Capability unit I–1; tree and shrub suitability group 3.

Ockley silt loam, 2 to 6 percent slopes, eroded (OcB2).—This soil occupies areas adjacent to soils on the bottom lands and to nearly level Ockley soils. The profile is similar to the one described as representative for the series, except that in cultivated areas the surface layer is slightly thinner, and moderate amounts of material from the subsoil are mixed with it. Slopes are less than 300 feet long.

Included with this soil in mapping were areas where the surface layer is loam and a few areas of soils that have slopes greater than 6 percent. Also included were small areas where the soil is only slightly eroded and some that are severely eroded.

Runoff is medium on this soil. Further erosion is a hazard in use and management.

This soil is suited to all crops commonly grown in the county. It is easy to cultivate. Under careful management that includes practices to help to control erosion, it can be used intensively for row crops. Capability unit IIe–3; tree and shrub suitability group 3.

Ockley silt loam, loamy substratum, 0 to 2 percent slopes (OsA).—This soil is between nearly level soils of the uplands and soils at lower elevation of the bottom lands. Its profile is similar to the one described as representative of the series, but the underlying material is mainly loamy. This underlying material consists of less than 12 inches of sand and minor amounts of fine gravel over loam till.

Included with this soil in mapping were a few areas of soils that are less than 2 acres in size and have slopes greater than 2 percent. Also included were some areas where no loose sand is above the glacial till.

Runoff is slow on this soil. This soil has no limitations to use and management.

This soil is suited to all cultivated crops commonly grown in the county. Under proper management it can be used intensively for row crops. Capability unit I–1; tree and shrub suitability group 3.

Ockley silt loam, loamy substratum, 2 to 6 percent slopes, eroded (OsB2).—This soil occupies areas between nearly level soils of the uplands and soils at lower elevation of the bottom lands. Its profile is similar to the one described as representative of the series, but in cultivated areas the surface layer is slightly thinner, and moderate amounts of dark-brown subsoil material are mixed with it. Also, the underlying material is mainly loamy. This underlying material consists of less than 12 inches of sand and minor amounts of fine gravel.

Included with this soil in mapping were some areas of soils where slopes are greater than 6 percent. Also included were some areas where no loose sand is above the glacial till.

Runoff is medium on this soil. Erosion is a hazard in use and management.

This Ockley soil is suited to all cultivated crops commonly grown in the county. Under careful management that includes practices to help to control erosion, it can be used intensively for row crops. Capability unit IIe–3; tree and shrub suitability group 3.

Ragsdale Series

The Ragsdale series consists of deep, very poorly drained, nearly level soils in depressions on uplands. These soils formed in loamy material. The native vegetation consisted of water-tolerant hardwoods and marsh grasses.

In a representative profile the surface layer is about 13 inches of very dark gray and black silty clay loam. The subsoil is about 29 inches of silty clay loam. The upper part is dark gray and has yellowish-brown mottles, and the lower part is yellowish brown and has gray mottles. The substratum, at a depth of 42 inches, is yellowish-brown silt loam and loam and has gray mottles in the upper part.

Permeability is slow in these soils, and available water capacity is high. Runoff is very slow, and water ponds in depressions. Content of organic matter is high, and the water table is seasonally high.

Representative profile of Ragsdale silty clay loam in a cultivated field 625 feet south and 725 feet west of the northeast corner of sec. 30, T. 16 N., R. 2 W.:

Ap—0 to 6 inches, very dark gray (10YR 3/1) silty clay loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A12—6 to 13 inches, black (10YR 2/1) silty clay loam; moderate, fine, subangular blocky structure; friable; neutral; clear, smooth boundary.

B21tg—13 to 20 inches, dark-gray (10YR 4/1) silty clay loam; many, fine, distinct, yellowish-brown (10YR 5/8) mottles; strong, medium, subangular blocky structure; firm; thick very dark gray (10YR 3/1) clay films on faces of peds; slightly acid; clear, wavy boundary.

B22tg—20 to 32 inches, dark-gray (10YR 4/1) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, coarse, prismatic structure that parts to moderate, coarse, subangular blocky; firm; thin dark-gray (10YR 4/1) clay films on faces of peds; neutral; clear, wavy boundary.

B23tg—32 to 42 inches, yellowish-brown (10YR 5/8) silty clay loam; many, medium, distinct, gray (10YR 5/1) mottles; moderate, coarse, prismatic structure that parts to weak, coarse, subangular blocky; friable; thin dark-gray (10YR 4/1) clay films on faces of peds; neutral; clear, wavy boundary.

C1—42 to 54 inches, yellowish-brown (10YR 5/8) silt loam; many, medium, distinct, gray (10YR 5/1) mottles; massive; friable; neutral; abrupt, wavy boundary.

IIC2—54 to 60 inches, yellowish-brown (10YR 5/4) loam; massive; friable; moderately alkaline, calcareous.

The A horizon ranges from 12 to 18 inches in thickness and from very dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2) or black (10YR 2/1) in color. In the B horizon dominant colors have a hue that ranges from 10YR to 5Y, a value of 4 to 6, and a chroma of 1 or 2. In the C horizon color has a hue of 10YR, a value of 5 to 7, and a chroma of 1 to 8. The C1 horizon is commonly silt loam, and the IIC2 horizon is commonly loam or clay loam. The solum ranges from 30 to 52 inches in thickness, and the silty material ranges from 36 to 60 inches in thickness.

Ragsdale soils are similar to Brookston, Rensselaer, and Mahalasville, clayey subsoil variant, soils. Ragsdale soils have less sand in the subsoil than Brookston, Mahalasville, and Rensselaer soils. They lack the stratified subsoil that is characteristic of Mahalasville and Rensselaer soils.

Ragsdale silty clay loam (0 to 2 percent slopes) (Ra).—This soil is in large level areas or in large tracts intermingled with lighter colored, islandlike areas of soils that are irregular in shape.

Included with this soil in mapping were areas of somewhat poorly drained Fincastle soils that are less than 2 acres in size. Also included were small areas where the surface layer is silt loam.

Wetness is the main limitation that affects use and management of this soil.

If this Ragsdale soil is adequately drained, it is suited to all crops commonly grown in the county. Under proper management it can be used intensively for row crops. Its limitations for uses commonly associated with residential development are severe. Capability unit IIw–1; tree and shrub suitability group 1.

Rensselaer Series

The Rensselaer series consists of deep, very poorly drained, nearly level soils in old glacial lakebeds and in glacial sluiceways. Depressions are present in places. These soils formed in loamy and sandy glacial material. The native vegetation consisted of water-tolerant hardwoods and marsh grasses.

In a representative profile the surface layer is about 16 inches of black and very dark gray clay loam. The subsoil is about 31 inches thick and has yellowish-brown mottles. The upper 12 inches is dark-gray clay loam, the next 10 inches is dark-gray heavy clay loam, and the lower 9 inches is gray sandy clay loam. The substratum, at a depth of 47 inches, is gray and light olive-brown stratified sand and silt.

Permeability is slow in these soils, and available water capacity is high. Runoff is very slow, and water ponds in depressions. Content of organic matter is high, and the water table is seasonally high.

Representative profile of Rensselaer clay loam in a cultivated field 800 feet south and 1,250 feet west of the northeast corner of the NW1/4 sec. 28, T. 14 N., R. 1 W.:

Ap—0 to 8 inches, black (10YR 2/1) clay loam, very dark gray (10YR 3/1) when crushed; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.

A12—8 to 16 inches, very dark gray (10YR 3/1) clay loam; moderate, medium, subangular blocky structure; firm; few fine pebbles; neutral; clear, wavy boundary.

B21tg—16 to 28 inches, dark-gray (10YR 4/1) clay loam; few, fine, yellowish-brown (10YR 5/6) mottles; moderate, medium and coarse, prismatic structure that parts to strong, medium, subangular blocky; firm; thin dark-gray (10YR 4/1) clay films on faces of most peds; few fine pebbles; neutral; gradual, wavy boundary.

B22tg—28 to 38 inches, dark-gray (10YR 4/1) heavy clay loam; many, coarse, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; thin dark-gray (10YR 4/1) clay and organic films on faces of most peds; few fine pebbles; neutral; gradual, wavy boundary.

B23tg—38 to 47 inches, gray (10YR 5/1) sandy clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; friable; thin gray (10YR 5/1) clay films on faces of peds and linings in a few voids; few fine pebbles; neutral; clear, irregular boundary.

C—47 to 72 inches, mottled gray (10YR 6/1) and light olive brown (2.5Y 5/4 and 5/6) loamy sand; seams of sandy loam and silt loam; single grained; loose; many pebbles; moderately alkaline, calcareous.

The A horizon ranges from 11 to 19 inches in thickness and from black (10YR 2/1) to very dark grayish brown (10YR 3/2) in color. The color of the B horizon ranges from dark gray (10YR 4/1) to grayish brown (10YR 5/2). Color of the mottles has a hue of 10YR or 2.5Y, a value of 4 or 5, and a chroma of 3 to 8. The B horizon ranges from silty clay loam to sandy clay loam. The C horizon is stratified sand, loamy sand, sandy loam, loam, and silt loam and in places contains pebbles. The solum ranges from 36 to 48 inches in thickness.

Rensselaer soils are similar to Brookston and Ragsdale soils. Rensselaer soils have more sand in the subsoil than Brookston and Ragsdale soils. They are stratified in the lower part of the subsoil, and Ragsdale soils are not.

Rensselaer clay loam (0 to 2 percent slopes) (Rn).—This soil is in large tracts in old lakebeds and in glacial sluiceways. In areas adjacent to tracts of lighter colored Whitaker soils, the surface layer is dark grayish brown.

Included with this soil in mapping were areas of Whitaker soils that are less than 2 acres in size. Also included were some areas where the surface layer is silt loam or silty clay loam and small areas where the underlying material is sand and gravel. In addition, small areas of muck were included and are indicated on the detailed soil map by a special symbol.

Wetness is the main limitation to use and management of this soil. Limitations for uses commonly associated with residential development are severe. If this Rensselaer soil is adequately drained, it is suited to all crops commonly grown in the county. Under proper management it can be used intensively for row crops. Capability unit IIw–1; tree and shrub suitability group 1.

Russell Series

The Russell series consists of deep, well-drained, gently sloping and moderately sloping soils on uplands. These soils formed in 22 to 40 inches of loess and underlying material weathered from loamy glacial till. The native vegetation consisted of hardwoods.

In a representative profile the surface layer is about 8 inches of dark-brown silt loam. The subsoil is about 51 inches thick. It is yellowish-brown and brown silt loam, light silty clay loam, and silty clay loam in the upper part and yellowish-brown clay loam and light clay loam in the lower part. The substratum, at a depth of 56 inches, is yellowish-brown light clay loam and loam.

Permeability is moderate in these soils, and available water capacity is high. Runoff is medium, and content of organic matter is moderate.

Representative profile of Russell silt loam, 2 to 6 percent slopes, eroded, in a cultivated field 600 feet west and 1,500 feet north of the southeast corner of sec. 17, T. 14 N., R. 2 W.:

Ap 0 to 8 inches, dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

B1—8 to 10 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; firm; strongly acid; clear, wavy boundary.

B21t—10 to 19 inches, yellowish-brown (10YR 5/6) light silty clay loam; moderate, medium, subangular blocky structure; firm; thin brown (7.5YR 4/4) clay films on faces of some peds; very strongly acid; clear, wavy boundary.

B22t—19 to 25 inches, brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin pale-brown (10YR 6/3) silt coatings on faces of some peds, thin brown (7.5YR 4/4) clay films on faces of others; very strongly acid; clear, wavy boundary.

IIB23t—25 to 42 inches, yellowish-brown (10YR 5/4) clay loam; weak, coarse, prismatic structure that parts to moderate, medium, subangular blocky; firm; thin dark yellowish-brown (10YR 3/4) clay films on faces of some peds; few pebbles; strongly acid; clear, wavy boundary.

IIB24t—42 to 56 inches, yellowish-brown (10YR 5/4) clay loam; weak, coarse, prismatic structure that parts to weak, medium, subangular blocky; firm; thin dark yellowish-brown (10YR 3/4) clay films on faces of some peds; few very dark grayish-brown (10YR 3/2) organic stains; few black (10YR 2/1) manganese and iron oxide concretions; few pebbles; neutral; clear, wavy boundary.

IIB3—56 to 59 inches, yellowish-brown (10YR 5/4) light clay loam; weak, coarse, prismatic structure; firm; few pebbles; neutral; clear, wavy boundary.

IIC—59 to 64 inches, yellowish-brown (10YR 5/4) loam; massive; friable; few pebbles; moderately alkaline, calcareous.

The A horizon ranges from 7 to 12 inches in thickness and from dark brown (10YR 4/3) to dark grayish brown (10YR 4/2) or brown (10YR 5/3) in color. In the B horizon dominant colors have a hue of 10YR or 7.5YR, a value of 4 or 5, and a chroma of 4 to 6. The C horizon is loam or sandy loam calcareous till. The solum ranges from 40 to 70 inches in thickness, and the loess deposit ranges from 22 to 40 inches in thickness.

Russell soils are similar to Miami and Xenia soils. They have less sand in the subsoil than Miami soils and differ from Xenia soils in that they are not mottled.

Russell silt loam, 2 to 6 percent slopes, eroded (RuB2).—This soil is in areas between nearly level soils of the uplands and steeper soils adjacent to the outwash plains and the bottom lands. It also is on sides of natural drainageways and in islandlike areas that are slightly higher than surrounding areas of somewhat poorly drained soils. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of nearly level Russell soils and a few small areas of Xenia soils. Also included were areas where the soil is only slightly eroded and, in places, areas where the soil is severely eroded.

Further erosion is a hazard in use and management of this soil. It is suited to all crops commonly grown in the county. Under careful management that includes practices to help to control erosion, this soil can be used extensively for row crops. Capability unit IIe–3; tree and shrub suitability group 3.

Russell silt loam, 6 to 12 percent slopes, eroded (RuC2).—This soil is in areas between soils of the uplands and soils at lower elevation of the bottom lands. It also is on sides of natural drainageways.

Included with this soil in mapping were small areas of Miami and Xenia soils. Also included were small areas where the soil is only slightly eroded and, in places, areas where the soil is severely eroded.

Further erosion is a hazard in use and management of this soil. It is suited to all crops commonly grown in the county. Under careful management that includes erosion control, it can be used intensively for row crops. It also can be used for hay, pasture, and trees. Capability unit IIIe–3; tree and shrub suitability group 3.

Shoals Series

The Shoals series consists of deep, somewhat poorly drained, nearly level soils on bottom lands. These soils formed in loamy sediment deposited by floods. The native vegetation consisted of hardwoods.

In a representative profile the surface layer is about 14 inches thick. The upper part is dark grayish-brown silt loam, and the lower part is brown silt loam that has yellowish-brown mottles. The subsoil is about 20 inches of silt loam. The upper 10 inches is mottled light brownish gray, yellowish brown, and brown. The lower 10 inches is grayish brown and has yellowish-brown mottles. The substratum, at a depth of 34 inches, is grayish-brown and yellowish-brown loam.

Permeability is moderate in these soils, and available water capacity is high. Runoff is slow, and the water table is seasonally high. Content of organic matter is moderate.

Representative profile of Shoals silt loam in a cultivated field 100 feet south and 600 feet east of the northwest corner of the SE¼ sec. 16, T. 14 N., R. 2 W.:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; friable; neutral; abrupt, smooth boundary.

A12—9 to 14 inches, brown (10YR 4/3) silt loam; common, medium, yellowish-brown (10YR 5/4) mottles; moderate, medium, granular structure; friable; neutral; clear, smooth boundary.

B21—14 to 24 inches, mottled light brownish-gray (10YR 6/2), yellowish-brown (10YR 5/6), and brown (7.5YR 4/4) silt loam; weak, fine, subangular blocky structure; friable; neutral; gradual, smooth boundary.

B22—24 to 34 inches, grayish-brown (10YR 5/2) silt loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; friable; neutral; gradual, smooth boundary.

C—34 to 60 inches, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/6) loam; massive; friable; neutral.

The Ap horizon ranges from 6 to 12 inches in thickness and from dark grayish brown (10YR 4/2) to brown (10YR 5/3) in color. It is predominantly silt loam, but in places it is loam or silty clay loam. The B horizon is silt loam, loam, light silty clay loam, or light clay loam. The color has a hue of 10YR to 2.5Y, a value of 4 to 6, and a chroma of 1 to 3. Mottles are common to many and faint to distinct. They have a hue of 10YR to 2.5Y, a value of 4 to 6, and a chroma of 3 to 6. The C horizon has layers of silt loam, loam, sandy loam, and sand. The solum ranges from 24 to 40 inches in thickness.

Shoals soils are similar to Genesee soils, but they are mottled and Genesee soils are not.

Shoals silt loam (0 to 2 percent slopes) (Sh).—This soil is on wide bottom lands and is adjacent to soils on the outwash plains or sloping soils of the uplands. It is also on narrow bottom lands in small areas dissected by meandering streams.

Included with this soil in mapping were small areas where the surface layer is loam or silty clay loam. Also included were a few areas where calcareous material is at a depth of 1 or 2 feet. Small areas of muck are included and are indicated on the detailed soil map by a special symbol.

Flooding is a hazard, and wetness limits use and management of this soil.

If this Shoals soil is adequately drained, it is suited to corn, soybeans, and other row crops commonly grown in the county. Under proper management, it can be used intensively for row crops. It is impractical to cultivate areas dissected by meandering streams, but these areas are suited to pasture and trees. Small areas can be used as wildlife habitat. The limitations for uses commonly

associated with residential development are severe. Capability unit IIw-7; tree and shrub suitability group 2.

Whitaker Series

The Whitaker series consists of deep, somewhat poorly drained, nearly level soils on outwash plains and in glacial sluiceways. These soils formed in loamy glacial outwash material. The native vegetation consisted of water-tolerant hardwoods.

In a representative profile the surface layer is about 9 inches of dark grayish-brown silt loam. The subsurface layer is about 3 inches of light brownish-gray silt loam that has pale-brown and yellowish-brown mottles. The subsoil is about 36 inches thick. The upper 8 inches is grayish-brown clay loam that has yellowish-brown and dark yellowish-brown mottles. The next 10 inches is yellowish-brown clay loam that has grayish-brown mottles, and 10 inches below it is dark yellowish-brown sandy clay loam that has grayish-brown and dark grayish-brown mottles. The lower 8 inches of the subsoil is brown sandy loam that has grayish-brown mottles. The substratum, at a depth of 48 inches, is yellowish-brown, light brownish-gray, and grayish-brown stratified loam, sandy loam, and medium sand.

Permeability is moderate in these soils, and available water capacity is high. Runoff is slow. The content of organic matter is moderate, and the water table is seasonally high.

Representative profile of Whitaker silt loam in a cultivated field 100 feet west and 100 feet south of the northeast corner of the SW¼SE¼ sec. 27, T. 16 N., R. 2 W.:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; friable; neutral; abrupt, smooth boundary.

A2—9 to 12 inches, light brownish-gray (10YR 6/2) silt loam; many, fine, distinct, pale-brown (10YR 6/3) and yellowish-brown (10YR 5/4) mottles; moderate, medium, angular blocky structure; friable; strongly acid; clear, wavy boundary.

B21t—12 to 20 inches, grayish-brown (10YR 5/2) clay loam; many, medium, distinct, yellowish brown (10YR 5/4) and dark yellowish-brown (10YR 4/4) mottles; moderate, medium, subangular blocky structure; firm; moderately thick grayish-brown (10YR 5/2) clay films on faces of some peds and thin gray (10YR 6/1) silt coatings on faces of others; strongly acid; clear, smooth boundary.

B22t—20 to 30 inches, yellowish-brown (10YR 5/4) clay loam; medium, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; firm; thin dark yellowish-brown (10YR 4/4) clay films on faces of some peds and thin gray (10YR 6/1) silt coatings on faces of others; many black (10YR 2/1) iron and manganese oxide concretions; medium acid; clear, wavy boundary.

B23t—30 to 40 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; many, coarse, distinct, grayish-brown (10YR 5/2) and dark grayish-brown (10YR 4/2) mottles; weak, coarse, subangular blocky structure; firm; thin dark yellowish-brown (10YR 4/4) clay films on faces of some peds; many black (10YR 2/1) iron and manganese oxide concretions; slightly acid; clear, wavy boundary.

B3—40 to 48 inches, brown (10YR 4/3) sandy loam; common, medium, distinct, grayish-brown (10YR 5/2) mottles; weak, coarse, subangular blocky structure; friable; neutral; clear, wavy boundary.

C—48 to 60 inches, yellowish-brown (10YR 5/6–5/8), light brownish-gray (10YR 6/2), and grayish-brown (10YR 5/2) stratified loam, sandy loam, and medium sand; massive; friable; moderately alkaline, calcareous.

The A horizon ranges from 6 to 12 inches in thickness and from dark gray (10YR 4/1) to pale brown (10YR 6/3) in color. The B horizon is commonly clay loam but in places is silty clay loam in the upper part. In the B horizon colors have a hue of 10YR, a value of 4 to 6, and a chroma of 1 to 4. In the C horizon colors have a hue of 10YR, a value of 4 to 6, and a chroma of 2 to 8. The C horizon is commonly stratified silt loam, loam, sandy loam, and sand and contains some gravel. The solum ranges from 36 to 60 inches in thickness, and the loess deposit ranges from 0 to 20 inches in thickness.

Whitaker soils are similar to Crosby and Fincastle soils. Whitaker soils have a stratified subsoil and substratum that are lacking in Crosby and Fincastle soils.

Whitaker silt loam (0 to 2 percent slopes) (Wh).—This somewhat poorly drained soil is in islandlike areas that are surrounded by very poorly drained soils. The areas are 2 to 20 acres in size and are irregular in shape.

Included with this soil in mapping were areas of soils that have less sand in the upper part of the subsoil than this soil. Also included were a few areas of Rensselaer clay loam and small areas where the surface layer is loam.

Wetness is the main limitation to use and management of this soil. If this Whitaker soil is adequately drained, it is suited to all crops commonly grown in the county. Under proper management it can be used intensively for row crops. Capability unit IIw-2; tree and shrub suitability group 2.

Xenia Series

The Xenia series consists of deep, moderately well drained, nearly level and gently sloping soils on uplands. These soils formed in 22 to 40 inches of loess and underlying material weathered from loamy glacial till. The native vegetation consisted of hardwoods.

In a representative profile the surface layer is about 9 inches of dark grayish-brown silt loam, and the subsurface layer is about 3 inches of yellowish-brown heavy silt loam. The subsoil, about 30 inches thick, is yellowish-brown and brown silty clay loam and clay loam. It has grayish-brown, yellowish-brown, and dark-brown mottles. The substratum, at a depth of 42 inches, is brown loam.

Permeability is moderately slow in these soils, and available water capacity is high. The content of organic matter is moderate.

Representative profile of Xenia silt loam, 2 to 6 percent slopes, eroded, in a cultivated field 600 feet south and 300 feet west of the northeast corner of the SE¼ sec. 21, T. 15 N., R. 2 W.:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; friable; neutral; abrupt, smooth boundary.

A2—9 to 12 inches, yellowish-brown (10YR 5/4) heavy silt loam; weak, fine, subangular blocky structure; friable; dark yellowish-brown (10YR 4/4) organic stains; neutral; clear, smooth boundary.

B1t—12 to 17 inches, yellowish-brown (10YR 5/6) light silty clay loam; weak, medium, subangular blocky structure; firm; thin dark yellowish-brown (10YR 4/4) clay films on faces of some peds and brown (10YR 5/3) silt coatings on faces of others; neutral; clear, wavy boundary.

B21t—17 to 23 inches, yellowish-brown (10YR 5/6) silty clay loam; common, medium, distinct, grayish-brown

(10YR 5/2) mottles; moderate, medium, subangular blocky structure; firm; light brownish-gray (10YR 6/2) silt coatings on faces of some peds and medium dark yellowish-brown (10YR 4/4) clay films on faces of others; medium acid; clear, wavy boundary.

B22t—23 to 30 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6 and 5/8) and grayish-brown (10YR 5/2) mottles; moderate, fine to medium, subangular blocky structure; firm; thick dark yellowish-brown (10YR 4/4) clay films on faces of some peds and light brownish-gray (10YR 6/2) silt coatings on faces of others; medium acid; gradual, wavy boundary.

IIB23t 30 to 34 inches, yellowish-brown (10YR 5/4) clay loam; common, medium, distinct grayish-brown (10YR 5/2) and some dark-brown (10YR 3/3) mottles; medium, coarse, subangular blocky structure; firm; thin dark grayish-brown (10YR 4/2) clay films on faces of peds; few glacial pebbles; neutral; clear, wavy boundary.

IIB3—34 to 42 inches, brown (10YR 5/3) and yellowish-brown (10YR 5/4) clay loam; weak, coarse, subangular blocky structure; friable; very dark grayish-brown (10YR 3/2) iron oxide concretions; few glacial pebbles; neutral; clear, wavy boundary.

IIC—42 to 60 inches, brown (10YR 5/3) loam; massive; firm; few glacial pebbles; moderately alkaline; calcareous.

The A horizon ranges from 8 to 18 inches in thickness and from dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) or yellowish brown (10YR 5/6) in color. The B horizon ranges from dark brown (10YR 4/3) to yellowish brown (10YR 5/6) in color. Colors of the mottles have a hue of 10YR, a value of 4 or 5, and a chroma of 1 to 6. The C horizon is loam or sandy loam calcareous till. The solum ranges from 36 to 60 inches in thickness and the loess deposit from 22 to 40 inches in thickness.

Xenia soils are similar to Fincastle and Russell soils. Xenia soils have a subsoil that is browner in the upper part than that of Fincastle soils and grayer in the lower part than that of Russell soils.

Xenia silt loam, 0 to 2 percent slopes (XeA).—This soil is in small areas adjacent to steeper soils, and on small crowns of hills and knolls. The profile is similar to the one described as representative of the series, but the surface layer and subsoil are thicker.

Included with this soil in mapping were small areas of Fincastle and Russell soils.

Runoff is slow on this soil. This soil has no limitations to use and management.

This Xenia soil is suited to all crops commonly grown in the county. Under proper management it can be used intensively for row crops. Capability unit I–1; tree and shrub suitability group 3.

Xenia silt loam, 2 to 6 percent slopes, eroded (XeB2).—This soil is in areas between nearly level soils and steeper soils of the uplands. It is also on sides of natural drainageways and in islandlike areas at slightly higher elevation and surrounded by somewhat poorly drained soils. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Fincastle and Russell soils. Also included were small areas where the soil is only slightly eroded and some where it is severely eroded.

Runoff is medium on this soil. Further erosion is a hazard in use and management.

This Xenia soil is suited to all crops commonly grown in the county. Under careful management that includes practices that help to control erosion, it can be used intensively for row crops. Capability unit IIe–3; tree and shrub suitability group 3.

Use and Management of the Soils

This section contains information about the use and management of the soils of Hendricks County for crops, tree and shrub plantings, recreation, wildlife, and engineering. A subsection on predicted yields of important crops is also included.

Use of the Soils for Crops

About four-fifths of the acreage of Hendricks County is used for crops and permanent pasture. The main cultivated crops are corn, soybeans, wheat, and oats. The principal forage crops are clover, alfalfa-grass mixtures, and clover-grass mixtures. A small acreage of tomatoes also is grown.

Winter cover crops, green-manure crops, and crop residues can be utilized to help maintain or increase the organic-matter content of the soils. Along with minimum tillage, they help also to preserve or improve soil tilth.

Sloping soils, such as those of the Miami series, erode when cultivated unless protective measures are used. Minimum tillage, contour cultivation, terraces, grassed waterways, proper use of crop residue, and the inclusion of grass and legumes in the rotation are effective in controlling erosion and also help to conserve moisture.

Wet soils, such as those of the Brookston series, have to be drained artificially by tile systems or by surface ditches before they can be used profitably to grow crops. Most tile and surface drains have outlets of open ditches that have been dug to help speed the drainage of excess water.

Soil tests should be made to determine the amounts of lime and fertilizer needed for cultivated crops and pasture. Crops respond well to the proper amounts of lime and fertilizer.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are so used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to tomatoes, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or engineering.

In the capability system, the kinds of soils are grouped at three levels: the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

- Class I soils have few limitations that restrict their use.
- Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife. (None of the soils in this county is in class V.)
- Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.
- Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.
- Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or to esthetic purposes. (None of the soils in this county is in class VIII.)

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the main crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-3 or IIIe-9. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages the capability units in Hendricks County are described, and suggestions for the use and management of the soils are given. The names of the soil series represented are given in the description of each unit, but this does not mean that all soils of the series named are in that particular unit. To find the capability unit classification of any specific soil, refer either to the Guide to Mapping Units at the back of this survey or to the soil description.

Capability-unit numbers are generally assigned locally but are part of a statewide system. All of the units of the systems are not represented in Hendricks County; therefore, the capability unit numbers in this soil survey are not consecutive.

CAPABILITY UNIT I-1

This unit consists of deep, nearly level soils of the Martinsville, Ockley, and Xenia series. These soils are on uplands and outwash plains. The Martinsville and Ockley soils are well drained, and the Xenia soil is moderately well drained. The soils in this unit have a surface layer of loam or silt loam.

Permeability is moderate in the Martinsville and Ockley soils and moderately slow in the Xenia soil. Available water capacity is high in all these soils.

The soils in this unit are suited to all crops commonly grown in the county. Corn and soybeans are the main crops, but small grains, clover-grass hay, and alfalfa-grass hay also are grown. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

The soils in this unit are easy to cultivate and have few limitations for farming. If these soils are properly managed, they can be used intensively for row crops.

CAPABILITY UNIT I-2

This unit consists of deep, nearly level, well-drained soils of the Genesee and the Genesee, sandy variant, series. These soils are on bottom lands. The soils in this unit have a surface layer of silt loam or sandy loam.

Permeability is moderate and available water capacity is high in the Genesee soil. Permeability is moderately rapid and available water capacity is moderate in the Genesee, sandy variant, soil.

The soils in this unit are suited to corn, soybeans, and other row crops commonly grown in the county. Areas that are narrow or irregular in shape are difficult to cultivate. They are suited to grass, wildlife habitat, and trees, especially walnut and tulip-poplar. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

The soils in this unit are easy to cultivate and have few limitations for farm use. Stream flooding in spring is the main hazard. Droughtiness limits use and management of the Genesee, sandy variant, soil. Well-established sod in overflow channels and along bare embankments helps to reduce scouring. These soils can be used intensively for row crops.

CAPABILITY UNIT IIe-1

Miami silt loam, 2 to 6 percent slopes, eroded, is the only soil in this unit. It is a deep, well-drained soil on

uplands. Permeability is moderate and available water capacity is high in this soil.

This soil is suited to all crops grown in the county. Corn, soybeans, small grains, clover-grass hay, and alfalfa-grass hay are the main crops. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

The soil in this unit is easy to cultivate. Further erosion is a hazard in use and management.

CAPABILITY UNIT IIe-3

This unit consists of deep, eroded soils of the Martinsville, Ockley, Russell, and Xenia series. The Martinsville, Ockley, and Russell soils are well drained, and the Xenia soil is moderately well drained. These soils are gently sloping and are on outwash plains and uplands. The soils in this unit have a surface layer of silt loam or loam.

Permeability is moderate in the Martinsville, Ockley, and Russell soils and moderately slow in the Xenia soil. Available water capacity is high in all these soils.

The soils in this unit are suited to all crops commonly grown in the county. Corn, soybeans, small grains, clover-grass hay, and alfalfa-grass hay (fig. 13) are the main crops grown. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

The soils in this unit are easy to cultivate. Further erosion is the main hazard in use and management, and practices that help to control further erosion are needed.

CAPABILITY UNIT IIe-9

Fox loam, 2 to 6 percent slopes, eroded, is the only soil in this unit. It is well-drained soil on outwash plains. It is moderately deep over sand and gravel.

Permeability above the sand and gravel is moderate in this soil, and available water capacity is moderate.

Figure 13.—**Baled hay on Russell silt loam, 2 to 6 percent slopes, eroded, capability unit IIe-3.**

The soil in this unit is suited to crops commonly grown in the county. Corn and soybeans are the main crops, but small grains and alfalfa-grass hay are also grown. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

The soil in this unit is easy to cultivate. Further erosion is a hazard in use and management, and insufficient moisture limits plant growth and yields. Irrigation helps to supplement the water supply for crops.

CAPABILITY UNIT IIe-12

Only the complex Crosby-Miami silt loams, 2 to 6 percent slopes, eroded, is in this unit. The soils in this complex are deep and somewhat poorly drained and well drained. They are on uplands.

Permeability is slow in the Crosby soil and moderate in the Miami soil. Available water capacity is high in both of these soils.

This complex is suited to all crops commonly grown in the county. The main crops grown are corn and soybeans. Small grains and grass-legume mixtures for hay and pasture are also grown.

The soils in this unit are easy to cultivate. Further erosion is a hazard in use and management. Wetness limits the use of the Crosby soil and restricts penetration of roots below a depth of 24 inches. Artificial drainage is needed. Logging during extremely wet periods damages tree roots and soil structure.

CAPABILITY UNIT IIw-1

This unit consists of deep, very poorly drained soils of the Brookston; Mahalasville, clayey subsoil variant; Ragsdale; and Rensselaer series. These nearly level soils are on uplands, on outwash plains, and in glacial lakebeds. The surface layer is silty clay loam, clay loam, or silt loam.

Permeability is slow in these soils. Available water capacity is high.

If the soils in this unit are drained, they are suited to all crops commonly grown in the county. Corn and soybeans are the main crops. The supply of moisture is high for trees, but tree roots are shallow because the water table is seasonally high. Because soils in this unit are extremely wet late in winter and early in spring, logging is impractical.

Plowing most of these soils when they are too wet leaves clods that are very firm when dry. These clods make it difficult to prepare a seedbed. Dry, very firm clods generally do not occur in Brookston silt loam, overwash. The seasonally high water table and ponding limit use and management of soils in this unit. If they are adequately drained and properly managed, they can be used intensively for row crops.

CAPABILITY UNIT IIw-2

This unit consists of deep, somewhat poorly drained soils of the Crosby, Fincastle, and Whitaker series. These soils are nearly level and gently sloping. All are on uplands except the Whitaker soil, which is on outwash plains. The soils in this unit have a surface layer of silt loam.

Permeability is slow in the Crosby and Fincastle soils

and moderate in the Whitaker soil. Available water capacity is high in all these soils.

The soils in this unit are suited to all cultivated crops commonly grown in the county. Corn and soybeans are the main crops, but small grains, hay, and pasture also are grown. The supply of moisture for trees is high, but wetness restricts penetration of roots below a depth of 24 inches. Logging during wet periods damages tree roots and soil structure.

The soils in this unit are easy to cultivate. Wetness is a limitation to use and management. If these soils are adequately drained and properly managed, they can be used intensively for row crops.

CAPABILITY UNIT IIw-7

Shoals silt loam is the only soil in this unit. It is a deep, somewhat poorly drained soil on bottom lands, and it is subject to flooding.

Permeability is moderate in this soil. Available water capacity is high.

If this soil is drained and protected from flooding, it is suited to corn and soybeans and other row crops commonly grown in the county. Many undrained areas are used for bluegrass pasture. Tree roots are shallow because the water table is seasonally high. In some places flooding affects logging. Logging operations during wet periods damage shallow roots and soil structure.

This soil is easy to cultivate. Stream flooding (fig. 14) in spring is the main hazard. The seasonally high water table and slow runoff limit use and management. Well-established sod in overflow channels and along bare embankments helps to control scouring. Channelling runoff water from uplands helps to control flooding in some areas. Under proper management this soil can be used intensively for row crops.

CAPABILITY UNIT IIs-1

The only soil in this unit is Fox loam, 0 to 2 percent slopes. This well-drained soil is on outwash plains. It is moderately deep over sand and gravel.

Permeability is moderate above the sand and gravel, and available water capacity is moderate.

This soil is suited to corn, soybeans, oats, wheat, permanent pasture, and trees. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

This soil is easy to cultivate. Droughtiness limits use and management. Irrigation helps to supplement the water supply for crops.

CAPABILITY UNIT IIIe-1

This unit consists of deep, well-drained soils of the Miami series. These soils are on uplands, and they are gently sloping or moderately sloping. The moderately

Figure 14.—**Flooding on Shoals silt loam, which is in capability unit IIw-7.**

sloping soil is eroded, and the gently sloping soil is severely eroded. The surface layer of these soils is silt loam or clay loam.

Permeability is moderate in these soils. Available water capacity is high.

The soils in this unit are suited to all crops commonly grown in the county. They are also suited to hay, pasture, and trees. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

Plowing the severely eroded soil when it is too wet leaves clods that are very firm when dry. These clods make it difficult to prepare a seedbed. Further erosion and runoff are hazards in use and management (fig. 15).

CAPABILITY UNIT IIIe-3

Russell silt loam, 6 to 12 percent slopes, eroded, is the only soil in this unit. This deep, well-drained soil is on uplands.

Permeability is moderate in this soil, and available water capacity is high.

This soil is suited to all crops commonly grown in the county. It is also suited to meadow crops, permanent pasture, and trees. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

This soil is easy to cultivate. Further erosion and runoff are hazards in management. An increase in content of organic matter and in fertility are needed in cultivated areas.

CAPABILITY UNIT IIIe-9

Fox loam, 6 to 12 percent slopes, eroded, is the only soil in this unit. This well-drained soil is on outwash plains. It is moderately deep over sand and gravel.

Permeability is moderate above the sand and gravel, and available water capacity is moderate.

This soil is suited to meadow crops, permanent pasture, and trees, but it also can be used for corn, soybeans, oats, and wheat. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

This soil is easy to cultivate. Further erosion and runoff are hazards, and droughtiness limits use and management.

CAPABILITY UNIT IVe-1

This unit consists of deep, well-drained soils of the Miami series. These soils are moderately sloping and severely eroded or strongly sloping and eroded. They are on uplands (fig. 16). The surface layer is silt loam or clay loam.

Permeability is moderate in these soils. Available water capacity is high.

The soils in this unit are suited to hay, pasture, and trees, but in places they can be used for all crops commonly grown in the county. The depth of the root zone

Figure 15.—A well-established grassed waterway for control of erosion. The soil is Miami silt loam, 6 to 12 percent slopes, eroded. It is in capability unit IIIe-1.

Figure 16.—Poor growth of crops on Miami clay loam, 6 to 12 percent slopes, severely eroded. This soil is in capability unit IVe–1.

and the supply of moisture are favorable for good growth of trees.

Plowing the severely eroded soil when it is too wet leaves clods that are very firm when dry. These clods make seedbed preparation difficult. Further erosion and runoff are hazards in management of these soils.

CAPABILITY UNIT IVe–9

Fox clay loam, 6 to 12 percent slopes, severely eroded, is the only soil in this unit. This well-drained soil is on outwash plains. It is moderately deep over sand and gravel.

Permeability is moderate above the sand and gravel, and available water capacity is moderate.

This soil is not suited to row crops, but it can be used for hay, pasture, and trees. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

The soil in this unit is easy to cultivate. Further erosion and runoff are hazards in management, and droughtiness limits use.

CAPABILITY UNIT VIe–1

This unit consists of deep, well-drained soils of the Miami series. These soils are strongly sloping and severely eroded or moderately steep and eroded. They are on uplands. The surface layer is silt loam or clay loam.

Permeability is moderate in these soils. Available water capacity is high.

The soils in this unit are not suited to row crops, but they can be used for permanent pasture and trees. Legumes, grasses, and small grains are the main crops. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

Further erosion, runoff, and strong slopes severely limit use and management of these soils. Farm equipment cannot be used safely in many areas.

CAPABILITY UNIT VIIe–2

Hennepin loam, 25 to 50 percent slopes, is the only soil in this unit. This deep, well-drained soil is on uplands.

Permeability is moderate in this soil. Available water capacity is high.

This soil is not suited to row crops, but it can be used for permanent pasture or trees. Small areas can be used as wildlife habitat. Most areas are wooded. The depth of the root zone and the supply of moisture are favorable for good growth of trees.

Steep and very steep slopes very severely limit use and management of this soil, and farm equipment cannot be used safely in many areas. Erosion and runoff are also hazards. Grazing must be controlled in pastured areas, and wooded areas should not be grazed.

Predicted yields

Predicted yields of the principal crops grown in Hendricks County are shown in table 2. These yields are averages for a period of 5 to 10 years. They are based on farm records, on interviews with farmers and members of the staff of the Purdue University Agricultural Experiment Station, and on direct observations by soil scientists and soil conservationists. Factors considered in making the predicted yields were the prevailing climate, the characteristics of the soil, and the influence of management on the soils.

It should be understood that these yield figures are not intended to apply directly to specific tracts of land for any particular year, because the soils vary somewhat from place to place, management practices differ from farm to farm, and weather conditions vary from year to year. Nevertheless, the predicted yields are useful in showing relative productivity of the soils.

The following are assumed to be part of a management system needed to obtain the yields in table 2.

1. Using cropping systems that maintain tilth and content of organic matter.
2. Controlling erosion to the maximum extent feasible, so that the quality of the soil is maintained or improved rather than reduced.
3. Maintaining a high level of fertility by means of frequent soil tests and use of fertilizer in accordance with recommendations of the Purdue University Agricultural Experiment Station.
4. Liming the soils in accordance with the results of soil tests.
5. Using crop residue to the fullest extent practicable to protect and improve the soil.
6. Following minimum tillage practices where needed because of the soil hazards of compaction and erosion.
7. Using only the crop varieties that are best adapted to the climate and the soil.
8. Controlling weeds carefully by tillage and spraying.
9. Draining wet areas well enough so that wetness does not restrict yields of adapted crops.

Trees and Shrubs [2]

Hendricks County was at one time covered almost completely with high-quality hardwood trees. Early settlers

[2] By John O. Holwager, woodland conservationist, Soil Conservation Service.

Table 2.—*Predicted average yields per acre of principal crops grown in the county*

[Dashed lines indicate that the crop is either not grown or is not suited to the soil specified]

Soil	Corn	Soybeans	Wheat	Clover-grass hay	Alfalfa-grass hay
	Bushels	*Bushels*	*Bushels*	*Tons*	*Tons*
Brookston silt loam, overwash	130	45	50	4.0	5.5
Brookston silty clay loam	130	45	50	4.0	5.5
Crosby silt loam, 0 to 3 percent slopes	120	40	50	4.0	5.5
Crosby-Miami silt loams, 2 to 6 percent slopes, eroded	115	35	50	4.0	5.0
Fincastle silt loam, 0 to 3 percent slopes	120	40	50	4.0	5.5
Fox loam, 0 to 2 percent slopes	85	30	50	3.5	4.5
Fox loam, 2 to 6 percent slopes, eroded	85	30	45	3.5	4.5
Fox loam, 6 to 12 percent slopes, eroded	80	25	40	3.2	4.0
Fox clay loam, 6 to 12 percent slopes, severely eroded	40	20	25	3.0	3.8
Genesee silt loam	115	40	-----	-----	-----
Genesee sandy loam, sandy variant	100	35	-----	-----	-----
Hennepin loam, 25 to 50 percent slopes	-----	-----	-----	-----	-----
Mahalasville silty clay loam, clayey subsoil variant	130	45	50	4.0	5.0
Martinsville loam, 0 to 2 percent slopes	120	40	50	4.5	5.5
Martinsville loam, 2 to 6 percent slopes, eroded	105	35	45	4.0	4.5
Miami silt loam, 2 to 6 percent slopes, eroded	110	35	50	4.0	5.0
Miami silt loam, 6 to 12 percent slopes, eroded	100	30	45	4.0	5.0
Miami silt loam, 12 to 18 percent slopes, eroded	75	25	40	3.5	4.5
Miami silt loam, 18 to 25 percent slopes, eroded	-----	-----	35	3.5	4.0
Miami clay loam, 2 to 6 percent slopes, severely eroded	100	30	45	3.8	5.0
Miami clay loam, 6 to 12 percent slopes, severely eroded	75	25	40	3.5	4.5
Miami clay loam, 12 to 18 percent slopes, severely eroded	-----	-----	30	3.0	4.0
Ockley silt loam, 0 to 2 percent slopes	120	40	50	4.5	5.5
Ockley silt loam, 2 to 6 percent slopes, eroded	105	35	45	4.0	4.5
Ockley silt loam, loamy substratum, 0 to 2 percent slopes	120	40	50	4.5	5.5
Ockley silt loam, loamy substratum, 2 to 6 percent slopes, eroded	110	35	45	4.0	4.5
Ragsdale silty clay loam	130	45	50	4.0	5.5
Rensselaer clay loam	130	45	50	4.0	5.5
Russell silt loam, 2 to 6 percent slopes, eroded	105	35	45	4.0	4.5
Russell silt loam, 6 to 12 percent slopes, eroded	90	30	40	4.0	4.5
Shoals silt loam	115	40	-----	-----	-----
Whitaker silt loam	115	40	50	4.0	5.5
Xenia silt loam, 0 to 2 percent slopes	120	45	50	4.0	5.5
Xenia silt loam, 2 to 6 percent slopes, eroded	105	35	45	3.8	4.5

recognized the soils' high potential for production of other crops and started land-clearing activities.

A forest survey conducted in 1967 showed approximately 15,000 acres of tree cover remaining in the county. Many of the wooded areas are small and widely scattered. Most of the trees are in wet areas that were not practical to drain or on steep banks along major streams.

The present cover of trees should be retained and added to by well-planned plantings to develop an attractive and healthy environment for local people. Tree-covered areas should be evaluated for their entire community benefits prior to any land-clearing programs, and not just in terms of wood products. Wooded areas have long-time value for the following uses:

1. To provide wind protection and control snow deposition, since scattered wooded tracts tend to break up regular wind patterns and to reduce wind velocity.
2. To provide food, cover, and travel lanes for wildlife and to encourage many forms of wildlife to exist and reproduce.
3. To help control erosion and to serve as filter strips for water-supplying streams and reservoirs.
4. To improve community areas used for county parks, outdoor education laboratories, and nature areas.
5. To reduce air pollution by giving off moisture and oxygen and by serving as nature's form of air conditioners.
6. To add to scenic beauty and to improve the general environment for people.

Each of the soils of Hendricks County has been placed in one of four groups according to suitability for trees and shrubs. Table 3 gives partial listings of trees and shrubs suitable for planting for specified purposes in the soils of each group. The tree and shrub suitability classification of each individual soil is given in the Guide to Mapping Units and also at the end of the soil description.

TABLE 3.—*Tree and shrub planting guide*

[Dashes indicate that, on the soils of the particular group, the plant is not suitable for any of the specified uses]

Plant	Characteristics of plant	Suitable uses, by tree and shrub suitability groups			
		Group 1	Group 2	Group 3	Group 4
Arborvitae, American.	Height of 20 to 30 feet at maturity; evergreen.	Screen planting and windbreak; ornamental.	----------	----------	----------
Arrowwood	Height of 6 to 10 feet at maturity; attractive flower and fruit; shade tolerant.	----------	Screen planting; wildlife food and cover; road cuts.	----------	----------
Ash, mountain	Height of 40 to 50 feet at maturity; white flowers, reddish orange fruit.	----------	----------	Ornamental and shade; wildlife food and cover.	----------
Autumn-olive	Height of 6 to 12 feet at maturity; yellow flowers, red berries, green leaves on top, silver leaves on bottom.	----------	Screen planting and windbreak; ornamental; wildlife food and cover; road cuts.	Screen planting and windbreak; ornamental; wildlife food and cover; road cuts and areas where soil is eroded.	Screen planting and windbreak; ornamental; wildlife food and cover; road cuts and areas where soil is eroded.
Basswood	Height of 80 to 100 feet at maturity; flowers attract honeybees; winged seeds.	----------	Shade tree; wildlife food and cover.	----------	----------
Birch:					
Red River	Height of 50 to 60 feet at maturity; red to pink bark, peels around trunk; shade tolerant.	Ornamental and shade; road cuts.	----------	----------	----------
White	Height of 30 to 40 feet at maturity; white bark; usually planted in clumps of 3 or 4 trees; shade tolerant.	----------	----------	Ornamental	----------

TABLE 3.—*Tree and shrub planting guide*—Continued

Plant	Characteristics of plant	Suitable uses, by tree and shrub suitability groups			
		Group 1	Group 2	Group 3	Group 4
Blackhaw	Height of 12 to 16 feet at maturity; white clustered flowers, blue-black fruit; shade tolerant.		Screen planting and windbreak; wildlife food and cover; road cuts.	Screen planting and windbreak; wildlife food and cover; road cuts and areas of eroded soil.	Screen planting and windbreak; wildlife food and cover; road cuts and areas of eroded soil.
Burningbush, winged.	Height of 8 to 10 feet at maturity; red fruit; winged twigs.			Screen planting; wildlife food and cover; road cuts and areas of eroded soil.	
Cherry, Cornelian.	Height of 8 to 10 feet at maturity; yellow blossoms, large red fruit; shade tolerant.		Screen planting; ornamental; wildlife food and cover.		
Cranberry, highbush.	Height of 6 to 10 feet at maturity; white flowers, red berries; red fall foliage.		Screen planting and windbreak; ornamental; wildlife food and cover.	Screen planting and windbreak; ornamental; wildlife food and cover.	
Dogwood:					
Flowering	Height of 12 to 20 feet at maturity; white flowers, red fruit; shade tolerant.			Ornamental and shade; wildlife food and cover.	Ornamental and shade; wildlife food and cover; road cuts and areas of eroded soil.
Gray	Height of 6 to 8 feet at maturity; white fruit, gray branches; shade tolerant.	Screen planting and windbreak; wildlife food and cover; road cuts.			
Red-osier	Height of 8 to 10 feet at maturity; green-white flower, white fruit, purplish-red to red branches; shade tolerant.	Screen planting and windbreak; wildlife food and cover; road cuts.	Screen planting and windbreak; wildlife food and cover; road cuts.	Screen planting and windbreak; wildlife food and cover; road cuts and areas of eroded soil.	
Silky	Height of 8 to 10 feet at maturity; white flowers, blue fruit; shade tolerant.	Screen planting and windbreak; wildlife food and cover; road cuts.			
Elderberry, American.	Height of 6 to 8 feet at maturity; white flower, blue-black fruit.	Wildlife food and cover.			
Forsythia	Height of 8 to 10 feet at maturity; yellow flowers; shade tolerant.			Screen planting and windbreak; road cuts and areas of eroded soil.	Screen planting and windbreak; road cuts and areas of eroded soil.
Gum:					
Black	Height of 50 to 60 feet at maturity; scarlet fall color; shade tolerant.	Ornamental and shade; wildlife food and cover.	Ornamental and shade; wildlife food and cover.	Ornamental and shade; wildlife food and cover.	
Red	Height of 50 to 60 feet at maturity; red to scarlet fall color; winged bark on limbs.	Ornamental and shade; road cuts.			

TABLE 3.—*Tree and shrub planting guide*—Continued

Plant	Characteristics of plant	Suitable uses, by tree and shrub suitability groups			
		Group 1	Group 2	Group 3	Group 4
Hazelnut, filbert.	Height of 6 to 8 feet at maturity; edible nuts.	----------	----------	Screen planting and windbreak; wildlife food and cover; road cuts and areas of eroded soil.	Screen planting and windbreak; wildlife food and cover; road cuts and areas of eroded soil.
Honeysuckle, amur.	Height of 10 to 15 feet at maturity; white flowers, red fruit; fruit attracts songbirds.	Screen planting and windbreak; wildlife food and cover; road cuts.	Screen planting and windbreak; wildlife food and cover; road cuts.	Screen planting and windbreak; wildlife food and cover; road cuts and areas of eroded soil.	----------
Larch, European.	Height is over 50 feet at maturity; sheds needles in fall; shallow roots.	Ornamental and shade.	----------	----------	----------
Lilac----------	Height of 10 to 12 feet at maturity; white to purple flowers, red fruit.	----------	----------	Screen planting and windbreak; ornamental; wildlife food and cover; road cuts and areas of eroded soil.	Screen planting and windbreak; ornamental; wildlife food and cover; road cuts and areas of eroded soil.
Locust:					
Black-----	Height of 60 to 80 feet at maturity; white flowers, short thorns.	----------	----------	Shade tree; wildlife food and cover; road cuts and areas of eroded soil.	----------
Honey (thornless).	Height of 50 to 60 feet at maturity; thin foliage, yellow fall color.	----------	----------	Shade tree----------	Shade tree; road cuts and areas of eroded soil.
Maple, red-----	Height of 50 to 60 feet at maturity; yellow to red fall foliage; rapid growth; shade tolerant.	Ornamental and shade; road cuts.	----------	----------	----------
Oak:					
Pin-------	Height of 60 to 80 feet at maturity; red fall color; horizontal limbs.	Ornamental and shade; wildlife food and cover.	Ornamental and shade; wildlife food and cover.	----------	----------
Scarlet----	Height of 60 to 70 feet at maturity; scarlet fall foliage.	----------	----------	----------	Ornamental and shade.
Pine:					
Austrian---	Height of 50 to 60 feet at maturity; two stiff needles in a clump.	----------	----------	----------	Screen planting and windbreak; ornamental and shade.
Jack	Height of 50 to 60 feet at maturity; two short, dark-green needles in a clump; crooked growth.	----------	----------	----------	Screen planting and windbreak; road cuts and areas of eroded soil.
Red-------	Height of 70 to 80 feet at maturity; two long, dark-green needles in a clump.	----------	----------	Screen planting and windbreak; ornamental and shade.	Screen planting and windbreak; ornamental and shade.

TABLE 3.—*Tree and shrub planting guide*—Continued

Plant	Characteristics of plant	Suitable uses, by tree and shrub suitability groups			
		Group 1	Group 2	Group 3	Group 4
Pine—Con.					
White	Height is over 100 feet at maturity; fine, soft, blue-green needles in a clump; long lived.	----------	Screen planting and windbreak; ornamental and shade.	Screen planting and windbreak; ornamental and shade.	----------
Plum, wild	Height of 8 to 10 feet at maturity; red fall color; thicket forming; shade tolerant.	----------	----------	----------	Wildlife food and cover; road cuts and areas of eroded soil.
Poplar:					
Lombardy.	Height of 40 to 50 feet at maturity; slender columnar growth; short lived.	Screen planting; ornamental and shade; road cuts.	----------	----------	----------
Tulip	Height of more than 100 feet at maturity; tulip-like flowers.	----------	Ornamental and shade; wildlife food and cover.	Ornamental and shade; wildlife food and cover.	----------
Russian-olive	Height of 15 to 20 feet at maturity; silver leaves; fruit.	----------	----------	----------	Screen planting; wildlife food and cover; road cuts and areas of eroded soil.
Serviceberry	Height of 8 to 15 feet at maturity; white flowers; edible fruit; shade tolerant.	----------	Ornamental; wildlife food and cover.	Screen planting; ornamental; wildlife food and cover.	----------
Spicebush	Height of 8 to 10 feet at maturity; yellow flowers; red fruit; shade tolerant.	Wildlife food and cover.	Wildlife food and cover.	----------	----------
Spruce:					
Norway	Height of 60 to 80 feet at maturity; short, dark-green needles; shade tolerant.	----------	Screen planting and windbreak; ornamental and shade.	Screen planting and windbreak; ornamental and shade.	----------
White	Height of 60 to 80 feet at maturity; light-green needles; slow growth; shade tolerant.	----------	Screen planting and windbreak; ornamental and shade.	----------	----------
Sumac:					
Cutleaf	Height of 8 to 15 feet at maturity.	----------	Screen planting; wildlife food and cover; road cuts.	----------	----------
Fragrant	Height of 6 to 8 feet at maturity; red fall color.	----------	----------	----------	Screen planting; wildlife food and cover; road cuts and areas of eroded soil.
Staghorn	Height of 10 to 15 feet at maturity; red fruit held into winter.	----------	----------	----------	Screen planting; wildlife food and cover; road cuts and areas of eroded soil.
Sycamore	Height of 90 to 100 feet at maturity; attractive white patches of bark.	----------	Ornamental and shade; road cuts.	----------	----------

TABLE 3.—*Tree and shrub planting guide*—Continued

Plant	Characteristics of plant	Suitable uses, by tree and shrub suitability groups			
		Group 1	Group 2	Group 3	Group 4
Viburnum, maple-leaf.	Height of 4 to 8 feet at maturity; white flowers, blue-black fruit; shade tolerant.		Wildlife food and cover; road cuts.	Wildlife food and cover; road cuts and areas of eroded soil.	Wildlife food and cover; road cuts and areas of eroded soil.
Willow:					
Blue arctic	Height of 5 to 7 feet at maturity; trims well into bluish-green hedge.	Screen planting; road cuts.			
Medium purple.	Height of 15 to 20 feet at maturity; well suited to very wet areas.	Screen planting and windbreak; road cuts.			

Recreation

The Outdoor Recreation Resources Review Commission predicts that the need for outdoor recreational facilities will greatly increase during the remaining years of the twentieth century (*2*). The Commission recommends that land-use planning include planning for outdoor recreation.

The landscape and resources of Hendricks County and the location of the county in relation to centers of population make it possible to develop some recreational enterprises that could produce income. The most likely enterprises include parks, improved picnic areas, golf courses, hunting areas, and fishing waters. Several private recreational facilities have been established and are in use.

In table 4 the soils in Hendricks County are rated according to their limitations for developing five kinds of recreation facilities. The ratings are guides for preliminary planning and selection of sites, and they do not eliminate the need for onsite investigation. The column headings and the factors considered in deriving the limitations are explained in the paragraphs that follow.

Picnic areas, parks, and other extensive play areas.—These are areas used for picnicking in a natural outdoor environment. They are subjected to heavy foot traffic. Factors evaluated are wetness, flood hazard, slope, surface texture, stoniness, and rockiness. Such features as presence of trees or ponds, which may affect the desirability of a site, are not considered.

Tent and trailer campsites.—These are areas for tent and trailer camping and the accompanying activities of outdoor living. Factors evaluated are wetness, flood hazard, permeability, slope, surface texture, stoniness, and rockiness.

Golf fairways.—Factors evaluated are wetness, flood hazard, slope, droughtiness, surface texture, stoniness, and rockiness.

Bridle paths, nature and hiking trails.—These are areas for riding, cross-country hiking, and other intensive uses that involve movement of people. Factors considered are wetness, flood hazard, slope, surface texture, stability, stoniness, and rockiness.

Playgrounds, athletic fields, and other intensive play areas.—These are areas for informal play and for organized games such as baseball, football, tennis, badminton, and the like. Factors evaluated are wetness, flood hazard, slope, surface texture, stoniness, and rockiness.

Wildlife

The soil, topography, climate, wide variety of native and other vegetation, and other features combine to favor the development of wildlife habitat in Hendricks County. In table 5 the soils of the county are rated according to their capacity for providing habitat for three general classes of wildlife: openland, woodland, and wetland. Potential for developing habitat for all three exists throughout most of the county. The three classes of wildlife are defined as follows:

Openland wildlife.—Birds, mammals, and reptiles that commonly frequent cropland, pasture, and hayland overgrown with grasses, herbs, and shrubs. Examples of openland wildlife are rabbits, red fox, skunks, quail, and meadowlarks. The elements of wildlife habitat considered are seed and grain crops, grasses and legumes, wild herbaceous upland plants, and hardwood woody plants.

Woodland wildlife.—Mammals and birds that frequent areas of hardwood and coniferous trees, shrubs, or combinations of this vegetation. Examples of woodland wildlife are squirrels, deer, raccoons, woodpeckers, and nuthatches. Elements of wildlife habitat used in rating soils for this kind of wildlife are grasses and legumes, wild herbaceous upland plants, hardwood woodland plants, and coniferous woodland plants.

Wetland wildlife.—Mammals, birds, and reptiles that frequent wet areas such as ponds, marshes, and swamps. Examples of wetland wildlife are muskrats, wild ducks and geese, kingfishers, and redwinged blackbirds. Elements of wildlife habitat used in rating soils for this kind of wildlife are wetland food and cover plants, seed and grain crops, shallow-water developments, and excavated ponds.

TABLE 4.—*Limitations of soils for recreational uses*

[The soils are rated on the basis of three classes of soil limitations: *slight* means the soil is relatively free of limitations or the limitations are easily overcome; *moderate* indicates that overcoming the limitations is generally feasible; *severe* indicates that the use of the soil for the purpose is questionable]

Soil series and map symbols	Picnic areas, parks, and other extensive play areas	Tent and trailer campsites	Golf fairways	Bridle paths, nature and hiking trails	Playgrounds, athletic fields, and other intensive play areas
Brookston: Br, Bs	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.
Crosby: CrA, CsB2. For Miami part of CsB2, see Miami series.	Moderate: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table; soft when wet.	Moderate: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table; soft when wet.	Moderate: somewhat poorly drained; seasonal high water table.
Fincastle: FcA	Moderate: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table; soft when wet.	Moderate: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table; soft when wet.	Moderate: somewhat poorly drained; seasonal high water table.
Fox:					
FoA	Slight	Slight	Slight	Slight	Slight.
FoB2	Slight	Slight	Slight	Slight	Moderate: slopes of 2 to 6 percent hinder development of site.
FoC2, FxC3	Moderate: 6 to 12 percent slopes; subject to erosion.	Moderate: 6 to 12 percent slopes; subject to erosion.	Moderate; s to 12 percent slopes; subject to erosion; droughty.	Slight	Severe: slopes of 6 to 12 percent hinder development of site.
Genesee: Gn	Moderate: subject to flooding during season of use.	Severe: subject to to flooding.	Moderate: subject to flooding.	Moderate: subject to flooding; soft when wet.	Severe: subject to flooding.
Genesee, sandy variant: Gs.	Moderate: subject to flooding during season of use.	Severe: subject to flooding.	Moderate: subject to flooding.	Moderate: subject to flooding.	Severe: subject to flooding.
Hennepin: HeF	Severe: subject to erosion; slope hinders development of site.	Severe: subject to erosion; slope hinders development of site.	Severe: subject to erosion.	Severe: subject to erosion.	Severe: slope severely hinders development of site.
Mahalasville, clayey subsoil variant: Mc.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.
Martinsville:					
MeA	Slight	Slight	Slight	Slight	Slight.
MeB2	Slight	Slight	Slight	Slight	Moderate: slopes of 2 to 6 percent hinder development of site.

TABLE 4.—*Limitations of soils for recreational uses*—Continued

Soil series and map symbols	Picnic areas, parks, and other extensive play areas	Tent and trailer campsites	Golf fairways	Bridle paths, nature and hiking trails	Playgrounds, athletic fields, and other intensive play areas
Miami:					
MmB2, MsB3	Slight	Slight	Slight	Slight	Moderate: slopes of 2 to 6 percent hinder development of site.
MmC2, MsC3	Moderate: 6 to 12 percent slopes; subject to erosion.	Moderate: 6 to 12 percent slopes; subject to erosion.	Moderate: 6 to 12 percent slopes; subject to erosion.	Slight	Severe: slopes of 6 to 12 percent hinder development of site.
MmD2, MsD3, MmE2.	Severe: 12 to 25 percent slopes; subject to erosion; slope hinders development of site.	Severe: 12 to 25 percent slopes; subject to erosion; slopes hinders development of site.	Severe: 12 to 25 percent slopes; subject to erosion.	Moderate: 12 to 25 percent slopes; subject to erosion.	Severe: slopes of 12 to 25 percent severely hinder development of site.
Ockley:					
OcA, OsA	Slight	Slight	Slight	Slight	Slight.
OcB2, OsB2	Slight	Slight	Slight	Slight	Moderate: slopes of 2 to 6 percent hinder development of site.
Ragsdale: Ra	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.
Rensselaer: Rn	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.
Russell:					
RuB2	Slight	Slight	Slight	Slight	Moderate: slopes of 2 to 6 percent hinder development of site.
RuC2	Moderate: 6 to 12 percent slopes; subject to erosion.	Moderate: 6 to 12 percent slopes; subject to erosion.	Moderate: 6 to 12 percent slopes; subject to erosion.	Slight	Severe: slopes of 6 to 12 percent severely hinder development of site.
Shoals: Sh	Severe: subject to flooding; somewhat poorly drained; seasonal high water table.	Severe: subject to flooding; somewhat poorly drained; seasonal high water table.	Moderate: subject to flooding; somewhat poorly drained; seasonal high water table.	Moderate: subject to flooding; somewhat poorly drained; seasonal high water table; soft when wet.	Severe: subject to flooding; somewhat poorly drained; seasonal high water table.
Whitaker: Wh	Moderate: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table; soft when wet.	Moderate: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table; soft when wet.	Moderate: somewhat poorly drained; seasonal high water table.
Xenia:					
XeA	Slight	Slight	Slight	Slight	Slight.
XeB2	Slight	Slight	Slight	Slight	Moderate: slopes of 2 to 6 percent hinder development of site.

TABLE 5.—*Suitability of soils for providing habitat for three kinds of wildlife*

[*Well suited* means that the soil is relatively free of limitations or that the limitations are easily overcome; *suited* indicates that overcoming the limitations is generally feasible; *poorly suited* indicates that the use of the soil for wildlife habitat is questionable; *not suited* means that extreme measures are needed to overcome the limitations and that use of the soil for wildlife habitat is generally impractical]

Soil name and map symbol	Openland wildlife	Woodland wildlife	Wetland wildlife
Brookston: Br, Bs	Poorly suited: very poorly drained; not suited to grain and seed crops; poorly suited to grasses and legumes and wild herbaceous upland plants; well suited to hardwood woody plants.	Well suited	Well suited.
Crosby: CrA, CsB2. For Miami part of CsB2, see Miami series.	Well suited	Suited: somewhat poorly drained; suited to grasses and legumes; well suited to wild herbaceous upland plants and hardwood woody plants; poorly suited to coniferous woody plants.	Suited where slopes are 0 to 3 percent: somewhat poorly drained; suited to wetland food and cover plants, shallow-water developments, ponds, and grain and seed crops. Poorly suited where slopes are 2 to 6 percent: somewhat poorly drained; poorly suited to wetland food and cover plants, shallow-water developments, and ponds; suited to grain and seed crops.
Fincastle: FcA	Well suited	Suited: somewhat poorly drained; suited to grasses and legumes; well suited to wild herbaceous upland plants and hardwood woody plants; poorly suited to coniferous woody plants.	Suited: slopes are 0 to 3 percent; somewhat poorly drained; suited to wetland food and cover plants, shallow-water developments, and ponds; suited to grain and seed crops.
Fox: FoA, FoB2, FoC2, FxC3.	Well suited	Well suited	Not suited: well drained; not suited to wetland food and cover plants, shallow-water developments, and excavated ponds; suited to grain and seed crops.
Genesee: Gn	Well suited	Well suited	Not suited: well drained; subject to occasional flooding; not suited to wetland food and cover plants, shallow-water developments, and ponds; suited to grain and seed crops.
Genesee, sandy variant: Gs.	Well suited	Well suited	Not suited: well drained; subject to occasional flooding; not suited to wetland food and cover plants, shallow-water developments, and ponds; suited to grain and seed crops.
Hennepin: HeF	Poorly suited: slopes are 25 to 50 percent; very severe erosion hazard; not suited to grain and seed crops; poorly suited to grasses and legumes; well suited to wild herbaceous upland plants and hardwood woody plants.	Poorly suited: well drained; poorly suited to grasses and legumes; well suited to wild herbaceous upland plants and hardwood woody plants; poorly suited to coniferous woody plants.	Not suited: well drained; not suited to wetland food and cover plants, shallow-water developments, and ponds; not suited to grain and seed crops.
Mahalasville, clayey subsoil variant: Mc.	Poorly suited: poorly drained; not suited to grain and seed crops; poorly suited to grasses and legumes and wild herbaceous upland plants; well suited to hardwood plants.	Well suited	Well suited.

TABLE 5.—*Suitability of soils for providing habitat for three kinds of wildlife*—Continued

Soil name and map symbol	Openland wildlife	Woodland wildlife	Wetland wildlife
Martinsville: MeA, MeB2	Well suited	Well suited	Not suited: well drained; not suited to wetland food and cover plants, shallow-water developments, and ponds; well suited to grain and seed crops.
Miami: MmB2, MsB3	Well suited: slopes are 2 to 6 percent.	Well suited: slopes are 2 to 6 percent.	Not suited: well drained.
MmC2, MsC3	Well suited: slopes are 6 to 12 percent.	Well suited: slopes are 6 to 12 percent.	Not suited: well drained.
MmD2, MsD3, MmE2.	Suited: slopes are 12 to 25 percent; not suited to grain and seed crops; suited to grasses and legumes and wild herbaceous upland plants; well suited to woody plants.	Suited: slopes are 12 to 25 percent; erosion hazard; suited to grasses and legumes and wild herbaceous plants; well suited to hardwood woody plants; poorly suited to coniferous woody plants.	Not suited: slopes are 12 to 25 percent; well drained; not suited to wetland food and cover plants, shallow-water developments, and ponds; not suited to grain and seed crops.
Ockley: OcA, OcB2, OsA, OsB2.	Well suited	Well suited	Not suited: well drained; not suited to wetland food and cover plants, shallow-water developments, and ponds; well suited to grain and seed crops.
Ragsdale: Ra	Poorly suited: very poorly drained; not suited to grain and seed crops; poorly suited to grasses and legumes and wild herbaceous upland plants; well suited to hardwood woody plants.	Well suited	Well suited.
Rensselaer: Rn	Poorly suited: very poorly drained; not suited to grain and seed crops; poorly suited to grasses and legumes and wild herbaceous upland plants; well suited to hardwood woody plants.	Well suited	Well suited.
Russell: RuB2	Well suited	Well suited: slopes are 2 to 6 percent.	Not suited: well drained.
RuC2	Well suited	Suited: slopes are 6 to 12 percent; suited to grasses and legumes and wild herbaceous upland plants; well suited to hardwood woody plants; poorly suited to coniferous woody plants.	Not suited: slopes are 6 to 12 percent; suited to grain and seed crops; well drained; not suited to wetland food and cover plants, shallow-water developments, and ponds.
Shoals: Sh	Well suited	Suited: somewhat poorly drained; suited to grasses and legumes; well suited to wild herbaceous upland plants and hardwood woody plants; poorly suited to coniferous woody plants.	Suited: somewhat poorly drained; subject to flooding; suited to wetland food and cover plants, shallow-water developments, and grain and seed crops; poorly suited to ponds.
Whitaker: Wh	Well suited	Suited: somewhat poorly drained; suited to grasses and legumes; well suited to wild herbaceous upland plants and hardwood woody plants; poorly suited to coniferous woody plants.	Suited: somewhat poorly drained; suited to wetland food and cover plants, shallow-water developments, ponds, and grain and seed crops.

TABLE 5.—*Suitability of soils for providing habitat for three kinds of wildlife*—Continued

Soil name and map symbol	Openland wildlife	Woodland wildlife	Wetland wildlife
Xenia:			
XeA	Well suited	Well suited	Poorly suited: slopes are 0 to 2 percent; moderately well drained; poorly suited to wetland food and cover plants, shallow-water developments, and ponds; well suited to grain and seed crops.
XeB2	Well suited	Well suited	Not suited: slopes are 2 to 6 percent; moderately well drained; not suited to wetland food and cover plants and shallow-water developments; poorly suited to ponds; well suited to grain and seed crops.

Engineering Uses of the Soils[3]

This section of the soil survey is useful to those who need information about soils used as structural material or as foundations upon which structures are built. Among those who can benefit from this section are planning commissioners, town and city managers, land developers, engineers, contractors, and farmers.

Among the soil properties important in engineering are permeability, shear strength, compaction characteristics, drainage, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds, small dams, and systems for disposal of sewage and refuse.

Information in this section can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built to predict the performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 6, 7, and 8, which show, respectively, the results of engineering laboratory tests on soil samples, estimates of several soil properties significant to engineering, and interpretations of soil properties as they affect various engineering uses.

This information, along with the soil map and other parts of this publication, can be used to make interpretations besides those in tables 7 and 8 and also can be used to make other useful maps. It does not, however, eliminate need for further investigation at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables. Also, inspection of sites, especially of small ones, is needed because a delineated area of a given soil may contain small areas of other soils that have strongly contrasting properties and different suitabilities or limitations for engineering.

Some of the terms used in this soil survey have different meanings in soil science than in engineering. The Glossary defines many of these terms as they are commonly used in soil science.

Engineering classification systems

The two systems most commonly used in classifying soils for engineering are the unified system *(6)*, used by SCS engineers, the Department of Defense, and others, and the AASHO system *(1)*, developed by the American Association of State Highway Officials and generally used by highway engineers.

In the Unified system, soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes, for example, ML–CL. Table 6 gives the Unified classification for each soil for which laboratory test data are available, and table 7 gives the estimated Unified classification of each soil in the county.

In the AASHO system, a soil is placed in one of seven basic groups, ranging from A–1 through A–7, on the basis of grain-size distribution, liquid limit, and plasticity

[3] MAX L. EVANS, area engineer, Soil Conservation Service, reviewed this section.

index. In group A–1 are gravelly soils of high bearing strength, the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest mineral soils for subgrade. If laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As an additional refinement, the relative engineering value of soils within any group can be indicated by group index numbers. Group index numbers range from 0 for the best material within a group to 20 for the poorest. The AASHO classification for tested soils, with group index numbers in parentheses, is given in table 6; the estimated AASHO classification for each soil, without a group index number, is given in table 7.

Engineering test data

Table 6 presents test data on samples of six soil series in the county. These samples were tested by standard procedures in the laboratories of the Joint Highway Research Project at Purdue University. The samples do not represent all the soils in Hendricks County, nor do they include the entire range of characteristics of any series sampled. Not all layers of each profile were sampled. The test results, however, have been used as a general guide in estimating the engineering properties of the soils of the county. Tests were made for moisture-density relationships, liquid limit, and plastic limit. Texture was determined by mechanical analysis.

Moisture-density relationships indicate the moisture content at which soil material can be compacted to maximum dry density. If a soil is compacted at successively higher moisture content, assuming that the compactive effort remains the same, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The ovendry weight, in pounds per cubic foot of soil material that was compacted at optimum moisture content, is termed the maximum dry density. Data on the relationship of moisture to density is important in planning earthwork, for a soil generally is most stable if compacted to about its maximum dry density when it is at approximately the optimum moisture content.

The tests for liquid limit and plastic limit indicate the effect of water on the consistence of soil material. The liquid limit is the moisture content at which the material changes from plastic to liquid. The plastic limit is the moisture content at which the soil material changes from semisolid to plastic. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Mechanical analysis to determine the particle-size distribution of the soil material was made by a combination of the sieve and hydrometer methods.

Estimated engineering properties

Table 7 gives estimates of soil properties that affect engineering significantly. Since actual tests were made only for the six soils listed in table 6, it was necessary to estimate the engineering properties for the rest of the soils. Estimates were based upon a comparison of these soils with those that were sampled and tested and upon experiences gained from working with and observing similar classified soils in other areas. These estimates provide information that an engineer would otherwise have to obtain for himself, but the estimates are not a substitute for the detailed tests needed at a specific site selected for construction purposes. The information in this table applies, in general, to a depth of 5 feet or less. The depth at which bedrock occurs is not given, because in this county all soils are more than 5 feet deep to bedrock. Column headings are explained in the following paragraphs. The "Unified" and "AASHO" headings are not explained because these classification systems were defined earlier in this section.

Depth to seasonal high water table.—This is the highest level of free water in the soil at the wettest time of the year.

Depth from surface.—Normally, only the major horizons and other depths are listed. Special horizons are listed when they have engineering properties significantly different from those of the adjacent horizons.

USDA texture.—The United States Department of Agriculture textural classification is based on the relative amount of sand, silt, and clay particles in a soil *(5)*.

Percentage passing sieves 10, 40, *and* 200.—The values in these columns are estimates rounded off to the nearest 5 percent. Gravel-size material does not pass the No. 10 sieve. The material that passes the No. 200 sieve is mainly silt and clay, but the smaller grains of very fine sand also pass it.

Permeability.—This term refers to the downward movement of water through undisturbed soil material in a saturated condition. Estimates are based mostly on texture, structure, and consistence.

Available water capacity.—This term refers to the capacity of a soil to hold water in a form available to plants. This equals the amount of water held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Reaction.—This is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

Frost-heave potential.—Frost action includes heave caused by ice lenses forming in a soil and the subsequent loss of strength as a result of excess moisture during periods of thawing. Three conditions must exist for frost heave to become a major consideration: (1) a susceptible soil, (2) a source of water during the freezing period, and (3) freezing temperatures that persist long enough to penetrate the ground.

Shrink-swell potential.—This is the quality of the soil that determines its volume change in proportion to its moisture content. The shrink-swell potential of a soil is estimated primarily on the basis of the amount and kind of clay in a soil.

Interpretations of engineering properties

Table 8 gives interpretations of the suitability of the soils for specific engineering uses. The interpretations in-

clude the suitability of the soils as sources of topsoil, sand and gravel, and road subgrade; soil features affecting use for highway location, agricultural drainage, ponds, grassed waterways, and foundations of buildings; and soil limitations for sewage disposal fields, sewage lagoons, and sanitary landfills. These interpretations apply to the representative profile of each soil series, as described in the section "Description of the Soils."

Some soil features may be helpful in one kind of engineering work and a hindrance in another kind. For example, a permeable substratum would make a soil unsuitable as a pond site but suitable for highway location. The column headings in table 8 are explained here.

Topsoil.—This refers to soil material, preferably high in organic-matter content, used to topdress back slopes, embankments, lawns, gardens, and other areas. The suitability ratings are based mainly on texture and organic-matter content.

Sand and gravel.—The suitability ratings apply to soil material within a depth of 5 to 7 feet. Sand or sand and gravel occur at variable depths within soils of the same series. Test pits are needed to determine the extent and availability of sand or sand and gravel.

Road subgrade material.—The suitability of the soil depends upon its performance when used as borrow for subgrade. Both the subsoil and the substratum are rated.

Highway location.—The entire profile is evaluated. Soil features considered are those that affect overall performance of the soil.

Agricultural drainage.—Texture, permeability, topography, seasonal water table, and restricting layers are the main features considered.

Reservoir areas.—Permeability, which affects seepage, is the main feature considered.

Embankments, dikes, and levees.—The features considered are those that affect the use of disturbed soil material for construction of embankments to impound surface water.

TABLE 6.—*Engineering*

[Tests performed by Soils and Pavement Design Laboratory, Joint Highway Research Project, School of Civil Engineering, Purdue University,

Soil name and location of sample	Parent material	Report No.	Depth	Moisture-density data[1]	
				Maximum dry density	Optimum moisture
			Inches	*Pounds per cubic foot*	*Percent*
Crosby silt loam: NE¼ sec. 23, T. 15 N., R. 1 W. (Modal).	Glacial till of Wisconsin age.	2–1	0–10	103	20
		2–5	24–33	104	19
		2–7	37–50	130	9
Fincastle silt loam: NW¼ sec. 10, T. 15 N., R. 2 W. (Modal).	Loess over glacial till of Wisconsin age.	6–1	0–9	101	21
		6–2	20–29	104	19
		6–3	52–68	125	10
Genesee silt loam: SW¼ sec. 10, T. 14 N., R. 2 W. (Modal).	Alluvial material.	7. 1	0–11	97	23
		7–2	21–32	106	18
		7–3	32–48	120	12
Martinsville loam: SE¼ sec. 21, T. 14 N., R. 1 W. (Modal).	Loamy stratified outwash over silt and sand.	3–1	0–9	108	17
		3–4	15–28	116	14
		3–9	60–86	122	12
Ockley silt loam: SW¼ sec. 9, T. 16 N., R. 2 W. (Modal).	Loamy outwash over sand and gravel covered with a thin layer of loess.	5–1	0–9	104	19
		5–5	24–34	109	17
		5–8	58–68	118	13
Rensselaer clay loam: NW¼ sec. 28, T. 14 N., R. 1 W. (Modal).	Loamy outwash over sand, silt, and a little fine gravel.	4–1	0–8	100	22
		4–4	28–38	107	17
		4–7	60–72	115	14

[1] Based on AASHO Designation: T 99–57 Method A (*1*).

[2] Mechanical analyses according to the AASHO Designation: T 88–57 (*1*). Results obtained by this procedure may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method

Grassed waterways.—Suitability depends on soil features that affect establishment, growth, and maintenance of vegetation and the layout and construction of waterways.

Terraces and diversions.—The features considered are those that affect the layout and construction of terraces and diversions. Such features include topography, texture, and depth to soil material not suited to crops.

Foundations of buildings.—The features considered are those of undisturbed soils that affect their suitability for supporting foundations of buildings up to three stories high. Such features include seasonal high water table, the hazard of flooding, and limitations affecting foundations.

Sewage disposal fields.—Factors evaluated are permeability, seasonal high water table, the hazard of flooding, topography, and depth to bedrock.

Sewage lagoons.—Factors evaluated are permeability, slope, depth to bedrock or sand and gravel, organic-matter content, the hazard of flooding, and soil texture.

Sanitary landfills.—Factors evaluated are seasonal high water table, natural drainage, the hazard of flooding, slope, depth to bedrock, degree of rockiness and stoniness, soil texture, and permeability.

Ratings of slight, moderate, or severe are given for sewage disposal fields, sewage lagoons, and sanitary landfills. The soil properties important in making the moderate and severe ratings are also given. A rating of *slight* means that the soil is relatively free of limitations for the intended use, and the facility is easily created, improved, or maintained. A *moderate* rating means that limitations need to be recognized but can be overcome with good management and careful design. A *severe* rating means that limitations are severe enough to make use questionable, and extreme measures are needed to overcome limitations.

test data

West Lafayette, Indiana, in accordance with standard methods of test of the American Association of State Highway Officials (AASHO)]

Mechanical analyses [2]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—						AASHO [3]	Unified [4]
1 in.	¾ in.	⅜ in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
-----	-----	-----	100	99	95	77	70	54	20	13	31	9	A-4(8)	CL
-----	-----	100	98	96	92	67	60	48	32	24	56	30	A-7-6(17)	CH
100	99	96	93	88	78	51	43	30	17	13	22	8	A-4(3)	CL
-----	-----	-----	100	99	96	93	70	49	16	10	34	10	A-4(8)	ML
-----	-----	-----	-----	100	99	96	87	65	34	25	56	30	A-7-6(19)	CH
-----	-----	100	97	94	86	68	58	45	30	20	23	8	A-4(7)	CL
-----	-----	-----	-----	-----	100	90	70	45	18	11	33	8	A-4(8)	ML
-----	-----	-----	-----	100	99	65	51	36	17	10	30	11	A-6(7)	CL
-----	-----	-----	-----	100	99	42	30	22	9	8	19	2	A-4(2)	SM
100	97	95	94	93	84	58	55	41	17	11	27	7	A-6(5)	ML-CL
-----	100	97	94	90	77	44	40	36	24	21	36	17	A-6(4)	SC
-----	-----	100	99	97	85	35	24	15	7	5	(5)	-----	A-2-4(0)	SM
-----	-----	-----	-----	100	98	90	83	58	18	10	32	8	A-4(8)	ML
100	98	98	94	86	68	43	35	28	20	14	50	31	A-7-6(9)	SC
100	94	87	79	70	42	9	7	5	2	1	-----	(5)	A-1-6(0)	SW-SM
-----	-----	100	99	97	87	64	58	52	30	19	46	21	A-7-6(12)	CL
-----	100	99	97	93	82	59	55	47	30	24	53	27	A-7-6(14)	CH
-----	-----	-----	100	99	90	13	8	5	3	3	-----	(5)	A-2-4(0)	SP

and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for use in naming the textural class of a soil.

[3] Based on AASHO Designation: M 145-49 (*1*).

[4] Based on MIL-STD-619B (*6*).

[5] Nonplastic.

TABLE 7.—*Estimated soil properties*

[An asterisk in the first column of this table indicates that at least one mapping unit in the series is made up of two or more kinds of soil. fully the instructions for referring to other series. The sign

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification: USDA texture	Classification: Unified	Classification: AASHO
Brookston:	*Feet*	*Inches*			
Br	[1] 0–1	0–18	Silt loam	ML or CL	A–4 or A–6
		18–50	Clay loam	CL	A–6
		50–60	Loam	ML or CL	A–4
Bs	[1] 0–1	0–36	Silty clay loam	OL or CL	A–7
		36–50	Clay loam	CL	A–6
		50–60	Loam	ML or CL	A–4
*Crosby: CrA, CsB2. For Miami part of CsB2, see Miami series.	1–3	0–17	Silt loam	ML or CL	A–4 or A–6
		17–33	Silty clay loam and clay loam	CL or CH	A–7
		33–60	Loam	CL or SC	A–4
Fincastle: FcA	1–3	0–9	Silt loam	ML or CL	A–4 or A–6
		9–29	Silty clay loam	CH	A–7
		29–42	Clay loam	CL	A–6
		42–68	Loam	CL or SC	A–4
Fox:					
FoA, FoB2, FoC2	>6	0–14	Loam	ML	A–4
		14–31	Clay loam and gravelly clay loam	SC or CL	A–6
		31–60	Sand and gravel	SW–SM	A–1
FxC3	>6	0–24	Clay loam	SC or CL	A–6
		24–60	Sand and gravel	SW–SM	A–1
Genesee: Gn	>6	0–21	Silt loam	ML	A–4
		21–32	Loam	CL or SC	A–6
		32–60	Sandy loam	SM	A–2 or A–4
Genesee, sandy variant: Gs	>6	0–25	Sandy loam	SM	A–2 or A–4
		25–60	Medium sand	SM or SW–SM	A–1
Hennepin: HeF	>6	0–14	Loam	CL or ML	A–4
		14–60	Loam	CL or SC	A–4
Mahalasville, clayey subsoil variant: Mc.	[1] 0–1	0–15	Silty clay loam	OH or CH	A–7
		15–52	Silty clay	CH	A–7
		52–66	Silty clay loam	CH	A–7
		66–72	Silt loam	ML	A–4
Martinsville: MeA, MeB2	>6	0–13	Loam	CL	A–4
		13–53	Clay loam, sandy clay loam, and sandy loam.	CL or SC	A–4
		53–60	Stratified silts, loam, sandy loam, and sand	ML or SM	A–2 or A–4
Miami:					
MmB2, MmC2, MmD2, MmE2	>6	0–8	Silt loam	ML or CL	A–4 or A–6
		8–31	Clay loam and silty clay loam	CL or CH	A–6 or A–7
		31–60	Loam	CL or SC	A–4
MsB3, MsC3, MsD3	>6	0–24	Clay loam	CL or CH	A–6 or A–7
		24–60	Loam	CL or SC	A–4

See footnotes at end of table.

significant to engineering

The different soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow care-
> means more than; the sign < means less than]

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Frost-heave potential	Shrink-swell potential
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					
			Inches per hour	*Inches per inch of soil*	*pH*		
90–100	90–100	75–85	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Moderate to high	Low.
95–100	85–95	70–90	0. 06–0. 20	0. 15–0. 19	6. 6–7. 3	Moderate	Moderate.
90–100	75–90	60–75	0. 20–0. 63	0. 10–0. 19	[2] 7. 4–8. 4	Moderate	Low.
100	90–100	85–95	0. 20–0. 63	0. 21–0. 23	6. 6–7. 3	Moderate	Moderate.
95–100	85–95	70–90	0. 06–0. 20	0. 15–0. 19	6. 6–7. 3	Moderate	Moderate.
90–100	75–90	60–75	0. 20–0. 63	0. 10–0. 19	[2] 7. 4–8. 4	Moderate	Low.
95–100	90–100	75–90	0. 63–2. 00	0. 22–0. 24	5. 1–7. 3	Moderate to high	Low.
95–100	85–95	65–85	0. 06–0. 20	0. 18–0. 20	6. 0–6. 5	Moderate	Moderate.
85–95	70–85	35–65	0. 20–0. 63	0. 05–0. 10	[2] 7. 4–8. 4	Moderate	Low.
95–100	90–100	75–95	0. 63–2. 00	0. 22–0. 24	6. 1–6. 5	Moderate to high	Low.
100	90–100	85–100	0. 06–0. 20	0. 18–0. 20	5. 1–5. 5	Moderate	Moderate.
95–100	85–100	65–85	0. 06–0. 20	0. 15–0. 19	6. 6–7. 3	Moderate	Moderate.
85–95	70–90	35–70	0. 20–0. 63	0. 05–0. 10	[2] 7. 4–8. 4	Moderate	Low.
85–95	85–100	50–75	0. 63–2. 00	0. 20–0. 22	6. 1–6. 5	Moderate	Low.
90–100	75–90	35–70	0. 63–2. 00	0. 19–0. 21	5. 6–7. 3	Moderate	Moderate.
50–70	20–45	5–15	>20. 00	<0. 08	[2] 7. 4–8. 4	Low	Low.
90–100	75–90	35–70	0. 63–2. 00	0. 19–0. 21	5. 6–7. 3	Moderate	Moderate.
50–70	20–45	5–15	>20. 00	<0. 08	[2] 7. 4–8. 4	Low	Low.
95–100	90–100	75–90	0. 63–2. 00	0. 22–0. 24	7. 3–7. 8	Moderate to high	Low.
90–100	75–100	45–65	0. 63–2. 00	0. 17–0. 19	7. 3–7. 8	Moderate	Low.
90–100	70–100	25–45	2. 00–6. 30	0. 11–0. 13	[2] 7. 4–8. 4	Moderate	Low.
90–100	70–100	25–45	2. 00–6. 30	0. 13–0. 15	6. 6–7. 3	Moderate	Low.
85–100	70–90	5–10	6. 30–20. 00	<0. 08	7. 4–7. 8	Low	Low.
85–95	70–85	50–65	0. 63–2. 00	0. 20–0. 22	6. 6–7. 3	Moderate	Low.
85–95	70–85	35–65	0. 63–2. 00	0. 05–0. 19	[2] 7. 4–8. 4	Moderate	Low.
100	95–100	95–100	0. 20–0. 63	0. 21–0. 23	6. 5–7. 3	Moderate	Moderate.
100	95–100	95–100	0. 06–0. 20	0. 11–0. 13	6. 5–7. 3	Moderate	Moderate.
100	95–100	95–100	0. 20–0. 63	0. 18–0. 20	7. 4–7. 8	Moderate	Moderate.
100	95–100	90–100	0. 20–0. 63	0. 20–0. 22	[2] 7. 4–8. 4	Moderate to high	Low.
85–100	80–95	50–75	0. 63–2. 00	0. 20–0. 22	6. 6–7. 3	Moderate	Low.
90–100	70–90	40–75	0. 63–2. 00	0. 15–0. 19	5. 1–6. 5	Moderate	Moderate.
85–100	70–90	30–70	0. 63–2. 00	0. 17–0. 20	[2] 7. 4–8. 4	Moderate	Low.
95–100	90–100	75–90	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Moderate to high	Low.
95–100	85–95	65–85	0. 63–2. 00	0. 15–0. 20	5. 1–6. 0	Moderate	Moderate.
85–95	70–85	35–65	0. 63–2. 00	0. 05–0. 19	[2] 7. 4–8. 4	Moderate	Low.
95–100	85–95	65–85	0. 63–2. 00	0. 15–0. 19	5. 1–6. 0	Moderate	Moderate.
85–95	70–85	35–65	0. 63–2. 00	0. 05–0. 19	[2] 7. 4–8. 4	Moderate	Low.

TABLE 7.—*Estimated soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification — USDA texture	Unified	AASHO
	Feet	*Inches*			
Ockley: OcA, OcB2	>6	0–14	Silt loam	ML or CL	A–4 or A–6
		14–24	Silty clay loam	CL	A–6
		24–48	Clay loam and sandy clay loam	CL or SC	A–6
		48–60	Sand and gravel	SW–SM	A–1
OsA, OsB2	>6	0–8	Silt loam	ML or CL	A–4 or A–6
		8–48	Clay loam	CL	A–6
		48–53	Sand and gravel	SW–SM	A–1
		53–60	Loam	CL or SC	A–4
Ragsdale: Ra	[1] 0–1	0–42	Silty clay loam	OL or CH	A–7
		42–60	Silt loam and loam	ML	A–4
Rensselaer: Rn	[1] 0–1	0–16	Clay loam	CL or CH	A–7
		16–47	Clay loam and sandy clay loam	CH	A–7
		47–72	Loamy sand, sandy loam, and silt loam	SC	A–2 or A–4
Russell: RuB2, RuC2	>6	0–10	Silt loam	ML or CL	A–4 or A–6
		10–25	Silty clay loam	CH	A–7
		25–59	Clay loam	CL or CH	A–6 or A–7
		59–64	Loam	CL or SC	A–4
Shoals: Sh	1–3	0–34	Silt loam	ML	A–4
		34–60	Stratified loam, sandy loam, and sandy clay loam.	SC or SM	A–2 or A–4
Whitaker: Wh	1–3	0–12	Silt loam	ML or CL	A–4 or A–6
		12–30	Clay loam	CL	A–6
		30–48	Sandy clay loam and sandy loam	SC or CL	A–6
		48–60	Stratified loam, sandy loam, and medium sand.	SC or SM	A–2 or A–4
Xenia: XeA, XeB2	3–6	0–12	Silt loam	ML or CL	A–4 or A–6
		12–30	Silty clay loam	CH	A–7
		30–42	Clay loam	CL or CH	A–6 or A–7
		42–60	Loam	CL or SC	A–4

[1] Ponded.

significant to engineering—Continued

Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 40 (0.42 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Permeability	Available water capacity	Reaction	Frost-heave potential	Shrink-swell potential
			Inches per hour	*Inches per inch of soil*	*pH*		
95–100	90–100	75–90	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Moderate to high	Low.
90–100	80–95	70–90	0. 63–2. 00	0. 18–0. 20	5. 6–6. 5	Moderate	Moderate.
80–100	65–90	40–75	0. 63–2. 00	0. 19–0. 21	5. 6–6. 5	Moderate	Moderate.
50–70	20–45	5–15	>20. 00	<0. 08	[2] 7. 4–8. 4	Low	Low.
100	90–100	75–90	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Moderate to high	Low.
90–100	80–95	70–90	0. 63–2. 00	0. 19–0. 21	5. 6–6. 5	Moderate	Moderate.
50–70	20–45	5–15	>20. 00	<0. 08	[2] 7. 4–8. 4	Low	Low.
85–95	70–85	45–65	0. 63–2. 00	0. 05–0. 19	[2] 7. 4–8. 4	Moderate	Low.
100	90–100	95–100	0. 06–0. 20	0. 21–0. 23	6. 1–7. 3	Moderate to high	Moderate.
95–100	90–100	85–95	0. 20–0. 63	0. 17–0. 22	[2] 7. 4–8. 4	High	Low.
95–100	75–95	60–80	0. 20–0. 63	0. 17–0. 19	6. 6–7. 3	Moderate	Moderate.
90–100	70–85	50–75	0. 06–0. 20	0. 19–0. 21	6. 6–7. 3	Moderate	Moderate.
90–100	70–95	10–50	0. 63–2. 00	0. 08–0. 22	[2] 7. 4–8. 4	Moderate	Low.
95–100	90–100	85–95	0. 63–2. 00	0. 22–0. 24	5. 1–7. 3	Moderate to high	Low.
95–100	90–100	85–95	0. 63–2. 00	0. 18–0. 20	4. 6–5. 0	Moderate	Moderate.
95–100	85–95	65–85	0. 63–2. 00	0. 15–0. 19	5. 1–7. 3	Moderate	Moderate.
85–95	70–85	35–65	0. 63–2. 00	0. 05–0. 19	[2] 7. 4–8. 4	Moderate	Low.
95–100	90–100	75–90	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Moderate to high	Low.
90–100	75–100	10–50	0. 63–2. 00	0. 11–0. 19	6. 6–7. 3	Moderate	Low.
95–100	90–100	65–90	0. 63–2. 00	0. 22–0. 24	5. 1–7. 3	Moderate to high	Low.
95–100	85–95	65–85	0. 63–2. 00	0. 15–0. 19	5. 1–6. 5	Moderate	Moderate.
90–100	70–90	45–55	0. 63–2. 00	0. 14–0. 18	6. 1–7. 3	Moderate	Low.
95–100	70–90	10–50	0. 63–2. 00	0. 07–0. 19	[2] 7. 4–8. 4	Moderate	Low.
95–100	90–100	85–95	0. 63–2. 00	0. 22–0. 24	6. 6–7. 3	Moderate to high	Low.
95–100	90–100	85–95	0. 20–0. 63	0. 18–0. 20	5. 6–7. 3	Moderate	Moderate.
95–100	85–95	65–85	0. 20–0. 63	0. 15–0. 19	6. 6–7. 3	Moderate	Moderate.
85–95	70–85	35–65	0. 63–2. 00	0. 05–0. 19	[2] 7. 4–8. 4	Moderate	Low.

[2] Calcareous.

TABLE 8.—*Interpretations of*

[An asterisk in the first column indicates that at least one mapping unit in the series is made up of two or more kinds of soil. The different instructions for referring

Soil series and map symbols	Suitability as source of—			Soil features affecting—			
	Topsoil	Sand and gravel	Road subgrade material	Highway location	Agricultural drainage	Farms ponds	
						Reservoir areas	Embankments, dikes, and levees
Brookston: Br, Bs.	Good in surface layer. Poor in subsoil: moderately fine texture; seasonal high water table.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate to low shrink-swell potential; subject to frost heave; fair to poor stability; seasonal high water table.	Seasonal high water table; subject to frost heave.	Seasonal high water table; slow permeability.	Moderate to slow seepage; seasonal high water table.	Fair to poor stability in subsoil and substratum: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.
*Crosby: CrA, CsB2. For Miami part of CsB2, see Miami series.	Good in surface layer. Fair to poor in subsoil: moderately fine texture; seasonal high water table.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate to low shrink-swell potential; subject to frost heave; fair to poor stability; seasonal high water table.	Seasonal high water table; subject to frost heave.	Seasonal high water table; slow permeability.	Moderate to slow seepage; seasonal high water table.	Fair to poor stability in subsoil and substratum: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.
Fincastle: FcA.	Good in surface layer. Fair to poor in subsoil: moderately fine texture; seasonal high water table.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate to low shrink-swell potential; subject to frost heave; fair to poor stability; seasonal high water table.	Seasonal high water table; subject to frost heave.	Seasonal high water table; slow permeability.	Moderate to slow seepage; seasonal high water table.	Fair to poor stability in subsoil and substratum: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.

See footnotes at end of table.

engineering properties

soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the to other series]

Soil features affecting—Continued			Degree and kind of limitation for—		
Grassed waterways	Terraces and diversions [1]	Foundations of buildings	Sewage disposal fields	Sewage lagoons	Sanitary landfills [2]
Soil features favorable; generally not needed.	Soil features favorable; generally not needed, but diversions can be used to channel excess water from higher soils.	Seasonal high water table; subject to ponding; fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Severe: slow permeability; seasonal high water table.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.
Soil features favorable.	Soil features favorable.	Seasonal high water table; fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Severe: slow permeability; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table; use limited to periods when water table is at a depth of more than 48 inches.
Soil features favorable.	Soil features favorable.	Seasonal high water table; fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Severe: slow permeability; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table; use limited to periods when water table is at a depth of more than 48 inches.	Moderate: somewhat poorly drained; seasonal high water table; use limited to periods when water table is at a depth of more than 48 inches.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as source of—			Soil features affecting—			
	Topsoil	Sand and gravel	Road subgrade material	Highway location	Agricultural drainage	Farms ponds	
						Reservoir areas	Embankments, dikes, and levees
Fox: FoA, FoB2, FoC2.	Fair to good in surface layer. Poor to fair in subsoil: moderately fine to coarse texture.	Good: about 3 feet of overburden on well-graded mixture of sand and gravel.	Poor in subsoil: fair shear strength; good to fair compaction characteristics; medium compressibility; moderate shrink-swell potential; subject to frost heave; fair stability. Very good in substratum: good to fair shear strength; fair to good compaction characteristics; slight compressibility; low shrink-swell potential; low susceptibility to frost heave; fair to poor stability.	Loose sand and gravel easily excavated but sometimes hinders hauling; cuts and fills often needed; difficult to vegetate exposed gravel in road cuts; subject to frost heave.	Natural drainage adequate; not needed.	Rapid seepage in substratum.	Fair stability in subsoil: good to fair compaction characteristics; low permeability when compacted; medium compressibility; good resistance to piping; moderate shrink-swell potential; fair shear strength. Fair to poor stability in substratum: fair to good compaction characteristics; high to moderate permeability when compacted; slight compressibility; fair to good resistance to piping; low shrink-swell potential; good to fair shear strength.
FxC3	Poor to fair in surface layer. Poor to fair in subsoil: moderately fine to coarse texture.	Good: about 3 feet of overburden on well-graded mixture of sand and gravel.	Poor in subsoil: fair shear strength; good to fair compaction characteristics; medium compressibility; moderate shrink-swell potential; subject to frost heave; fair stability. Very good in substratum: good to fair shear strength; fair to good compaction characteristics; slight compressibility; low shrink-swell potential; low susceptibility to frost heave; fair to poor stability.	Loose sand and gravel easily excavated but sometimes hinders hauling; cuts and fills often needed; difficult to vegetate exposed gravel in road cuts; subject to frost heave in subsoil.	Natural drainage adequate; not needed.	Rapid seepage in substratum.	Fair stability in subsoil: good to fair compaction characteristics; low permeability when compacted; medium compressibility; good resistance to piping; moderate shrink-swell potential; fair shear strength Fair to poor stability in substratum: fair to good compaction characteristics; high to moderate permeability when compacted; slight compressibility; fair to good resistance to piping; low shrink-swell potential; good to fair shear strength.

See footnotes at end of table.

engineering properties—Continued

Soil features affecting—Continued			Degree and kind of limitation for—		
Grassed waterways	Terraces and diversions [1]	Foundations of buildings	Sewage disposal fields	Sewage lagoons	Sanitary landfills [2]
Difficult to vegetate; erosion hazard during construction.	Difficult to vegetate; erosion hazard during construction.	Good to fair shear strength; moderate to low shrink-swell potential; medium compressibility in subsoil; slight compressibility in substratum.	Slight: moderate permeability; possible contamination of ground water.	Severe: porous sand and gravel at depths of 31 to 60 inches; very rapid permeability in sand and gravel.	Severe: porous sand and gravel at depths of 31 to 60 inches; hazard of free leachate flow to ground water.
Difficult to vegetate; erosion hazard during construction.	Difficult to vegetate; erosion hazard during construction.	Good to fair shear strength; moderate to low shrink-swell potential; medium compressibility in subsoil; slight compressibility in substratum.	Slight: moderate permeability; possible contamination of ground water.	Severe: porous sand and gravel at depths of 31 to 60 inches; very rapid permeability in sand and gravel.	Severe: porous sand and gravel at depths of 31 to 60 inches; hazard of free leachate flow to ground water.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as source of— Topsoil	Sand and gravel	Road subgrade material	Soil features affecting— Highway location	Agricultural drainage	Farms ponds: Reservoir areas	Farms ponds: Embankments, dikes, and levees
Genesee: Gn.	Good in surface layer: subject to stream flooding.	Poor to unsuitable: location of sand and gravel spotty; deep overburden; dipper equipment necessary.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; low shrink-swell potential; subject to frost heave; fair stability.	Subject to flooding and frost heave.	Natural drainage adequate; subject to flooding; not needed.	Moderate to slow seepage; subject to flooding.	Fair stability in subsoil and substratum: fair to poor compaction characteristics; moderate to low permeability when compacted; medium to high compressibility; fair resistance to piping; low shrink-swell potential; fair to poor shear strength.
Genesee sandy variant: Gs.	Fair in surface layer. Fair to poor in subsoil: coarse texture; subject to flooding.	Poor to unsuitable; location of sand and gravel spotty; deep overburden; dipper equipment necessary.	Fair to good in subsoil and substratum: fair shear strength; fair compaction characteristics; slight compressibility; low shrink-swell potential; subject to frost heave; fair stability.	Subject to flooding and frost heave.	Natural drainage adequate; subject to flooding; not needed.	Rapid seepage in substratum; subject to flooding.	Fair stability in subsoil and substratum: fair compaction characteristics; high to moderate permeability when compacted; slight compressibility; fair to good resistance to piping; low shrink-swell potential; fair shear strength.
Hennepin: HeF.	Fair in surface layer: thin; steep slopes. Fair to poor in subsoil.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; low shrink-swell potential; subject to frost heave; fair stability.	Cuts and fills needed; difficult to vegetate road cuts; subject to frost heave.	Natural drainage adequate; not needed.	Moderate to slow seepage.	Fair stability in subsoil and substratum: fair to poor compaction characteristics; moderate to low permeability when compacted; medium to high compressibility; fair resistance to piping; low shrink-swell potential; fair to poor shear strength.
Mahalasville, clayey subsoil variant: Mc.	Fair to good in surface layer: moderately fine texture. Poor in subsoil: fine texture; seasonal high water table.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate shrink-swell potential; subject to frost heave; fair to poor stability; seasonal high water table.	Seasonal high water table; subject to frost heave.	Seasonal high water table; slow permeability; stratified silt and clay below depth of 36 inches.	Moderate to slow seepage; seasonal high water table.	Fair to poor stability in subsoil and substratum: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate shrink-swell potential; fair to poor shear strength.

See footnotes at end of table.

engineering properties—Continued

Soil features affecting—Continued			Degree and kind of limitation for—		
Grassed waterways	Terraces and diversions [1]	Foundations of buildings	Sewage disposal fields	Sewage lagoons	Sanitary landfills [2]
Soil features favorable; generally not needed.	Soil features favorable; not needed because of topography.	Subject to flooding; fair to poor shear strength; low shrink-swell potential; medium to high compressibility.	Severe: subject to flooding; moderate permeability.	Severe: subject to flooding.	Severe: subject to flooding.
Difficult to vegetate; generally not needed.	Not needed	Subject to flooding; fair to poor shear strength; low shrink-swell potential; medium to high compressibility.	Severe: subject to flooding; moderately rapid permeability.	Severe: subject to flooding.	Severe: subject to flooding.
Difficult to vegetate; erosion hazard during construction.	Not needed	Fair to poor shear strength; low shrink-swell potential; medium to high compressibility.	Severe: slopes too steep; moderate permeability.	Severe: steep slopes severely hinder development of site.	Severe: steep slopes severely hinder development of site.
Soil features favorable; generally not needed.	Soil features favorable; generally not needed, but diversions can be used to channel excess water from higher soils.	Seasonal high water table; subject to ponding; fair to poor shear strength; moderate shrink-swell potential; medium to high compressibility.	Severe: slow permeability; seasonal high water table.	Severe: very poorly drained; seasonal high water table.	Severe: very poorly drained; seasonal high water table; clayey material hinders trafficability and is subject to cracking or drying.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as source of—			Soil features affecting—			
	Topsoil	Sand and gravel	Road subgrade material	Highway location	Agricultural drainage	Farms ponds	
						Reservoir areas	Embankments, dikes, and levees
Martinsville: Me A, Me B2.	Good to fair in surface layer. Fair to poor in subsoil: moderately fine texture.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate to low shrink-swell potential; subject to frost heave; fair stability.	Cuts and fills generally needed; subject to frost heave.	Natural drainage adequate; not needed.	Moderate seepage.	Fair stability in subsoil and substratum: fair to poor compaction characteristics; moderate to low permeability when compacted; medium to high compressibility; fair resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.
Miami: Mm B2, MmC2, MmD2, Mm E2.	Fair to poor in surface layer and in subsoil: moderately fine texture.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate to low shrink-swell potential; subject to frost heave; fair to poor stability.	Cuts and fills needed; subject to frost heave.	Natural drainage adequate; not needed.	Moderate to slow seepage.	Fair to poor stability in substratum: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.
Ms B3, MsC3, MsD3.	Poor in surface layer and subsoil: moderately fine texture.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate to low shrink-swell potential; subject to frost heave; fair to poor stability.	Cuts and fills needed; subject to frost heave.	Natural drainage adequate; not needed.	Moderate to slow seepage.	Fair to poor stability in subsoil and substratum: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.

See footnotes at end of table.

engineering properties—Continued

Soil features affecting—Continued			Degree and kind of limitation for—		
Grassed waterways	Terraces and diversions [1]	Foundations of buildings	Sewage disposal fields	Sewage lagoons	Sanitary landfills [2]
Soil features favorable.	Soil features favorable.	Fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Slight	Severe: underlying material too sandy to hold water.	Severe: porous sand and gravel at depth of 48 to 68 inches; hazard of free leachate flow to ground water.
Soil features favorable.	Soil features favorable.	Fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Moderate: moderate permeability.	Moderate where slopes are 2 to 6 percent: moderate permeability. Severe where slopes are 6 to 25 percent: slope severely hinders development of site.	Slight where slopes are 2 to 12 percent. Moderate where slopes are 12 to 25 percent: slope moderately hinders development of site.
Soil features favorable.	Soil features favorable.	Fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Moderate: moderate permeability.	Moderate where slopes are 2 to 6 percent: moderate permeability. Severe where slopes are 6 to 18 percent: slope severely hinders development of site.	Slight where slopes are 2 to 12 percent. Moderate where slopes are 12 to 18 percent: slope hinders development of site.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as source of— Topsoil	Sand and gravel	Road subgrade material	Soil features affecting— Highway location	Agricultural drainage	Farms ponds: Reservoir areas	Farms ponds: Embankments, dikes, and levees
Ockley: OcA, OcB2.	Good in surface layer. Fair in subsoil: moderately fine to coarse texture.	Good: at least 3 feet of overburden on well-graded mixture of sand and gravel.	Poor in subsoil: fair shear strength; good to fair compaction characteristics; medium compressibility; moderate shrink-swell potential; subject to frost heave; fair stability. Very good in substratum: good to fair shear strength; fair to good compaction characteristics; slight compressibility; low shrink-swell potential; low susceptibility to frost heave; fair to poor stability.	Loose sand and gravel easy to excavate but sometimes hinders hauling; cuts and fills often needed; difficult to vegetate exposed gravel in road cuts; subsoil subject to frost heave.	Natural drainage adequate; not needed.	Rapid seepage in substratum.	Fair stability in subsoil: good to fair compaction characteristics; low permeability when compacted; medium compressibility; good resistance to piping; moderate shrink-swell potential; fair shear strength. Fair to poor stability in substratum: fair to good compaction characteristics; high to moderate permeability when compacted; slight compressibility; fair to good resistance to piping; low shrink-swell potential; good to fair shear strength.
OsA, OsB2.	Good in surface layer. Fair in subsoil; moderately fine to coarse texture.	Not suitable.	Poor in subsoil: fair shear strength; good to fair compaction characteristics; medium compressibility; moderate shrink-swell potential; subject to frost heave; fair stability. Very good in substratum: good to fair shear strength; fair to good compaction characteristics; slight compressibility; low shrink-swell potential; low susceptibility to frost heave; fair to poor stability.	Cuts and fills needed; subject to frost heave.	Natural drainage adequate; not needed.	Moderate to slow seepage.	Fair to poor stability in subsoil and substratum: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.
Ragsdale: Ra.	Good in surface layer. Fair to poor in subsoil; moderately fine texture; seasonal high water table.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair compaction characteristics; medium compressibility; moderate to low shrink-swell potential; subject to frost heave; fair stability; seasonal high water table.	Seasonal high water table; moderately high susceptibility to frost heave.	Seasonal high water table; slow permeability.	Moderate to slow seepage; seasonal high water table.	Fair stability in subsoil and substratum: fair compaction characteristics; moderate to low permeability when compacted; medium compressibility; fair resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.

See footnotes at end of table.

engineering properties—Continued

Soil features affecting—Continued			Degree and kind of limitation for—		
Grassed waterways	Terraces and diversions [1]	Foundations of buildings	Sewage disposal fields	Sewage lagoons	Sanitary landfills [2]
Soil features favorable.	Soil features favorable.	Good to fair shear strength; moderate to low shrink-swell potential; medium compressibility in subsoil; slight compressibility in substratum.	Slight: moderate permeability; possible contamination of ground water.	Severe: porous sand and gravel at depth of 48 to 68 inches; very rapid permeability in sand and gravel.	Severe: porous sand and gravel at depth of 48 to 68 inches; hazard of leachate flow to ground water.
Soil features favorable.	Soil features favorable.	Fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Moderate: moderate permeability.	Moderate: lateral seepage through strata of sand and gravel.	Sight.
Soil features favorable; generally not needed.	Soil features favorable; generally not needed, but diversions can be used to channel excess water from higher soils.	Seasonal high water table; subject to ponding; fair to poor shear strength; moderate to low shrink-swell potential; medium compressibility; moderate to high susceptibility to frost heave.	Severe: slow permeability; seasonal high water table.	Severe: very poorly drained; seasonal high water table.	Severe: very poorly drained; seasonal high water table; subject to ponding; silty clay loam and silt loam materials hinder trafficability.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as source of—			Soil features affecting—			
	Topsoil	Sand and gravel	Road subgrade material	Highway location	Agricultural drainage	Farms ponds: Reservoir areas	Farms ponds: Embankments, dikes, and levees
Rensselaer: Rn.	Fair to good in surface layer: moderately fine texture. Poor in subsoil: moderately fine texture; seasonal high water table.	Not suitable.	Poor in subsoil: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate shrink-swell potential; subject to frost heave; fair stability; seasonal high water table. Fair to poor in substratum: fair to poor shear strength; poor compaction characteristics; medium compressibility; low shrink-swell potential; subject to frost heave; poor stability.	Seasonal high water table; subject to frost heave.	Seasonal high water table; slow permeability; sand and gravel substratum.	Moderate to slow seepage; seasonal high water table.	Fair stability in subsoil: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate shrink-swell potential; fair to poor shear strength. Poor stability in substratum: poor compaction characteristics; moderate permeability when compacted; medium compressibility; poor resistance to piping; low shrink-swell potential; fair to poor shear strength.
Russell: RuB2, RuC2.	Fair to good in surface layer. Fair to poor in subsoil: somewhat moderately fine texture.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate to low shrink-swell potential; subject to frost heave; fair to poor stability.	Cuts and fills needed; subject to frost heave.	Natural drainage adequate; not needed.	Moderate to slow seepage.	Fair to poor stability in subsoil and substratum: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.
Shoals: Sh	Good in surface layer. Good to fair in subsoil: subject to stream flooding; seasonal high water table.	Poor to unsuitable; location of sand and gravel spotty; deep overburden; dipper equipment necessary.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; low shrink-swell potential; subject to frost heave; seasonal high water table.	Subject to flooding and frost heave; seasonal high water table.	Seasonal high water table; moderate permeability; subject to flooding.	Moderate to slow seepage; subject to flooding; seasonal high water table.	Fair stability in subsoil and substratum: fair to poor compaction characteristics; moderate to low permeability when compacted; medium to high compressibility; fair resistance to piping; low shrink-swell potential; fair to poor shear strength.

See footnotes at end of table.

engineering properties—Continued

Soil features affecting—Continued			Degree and kind of limitation for—		
Grassed waterways	Terraces and diversions [1]	Foundations of buildings	Sewage disposal fields	Sewage lagoons	Sanitary landfills [2]
Soil features favorable; generally not needed.	Soil features favorable; generally not needed, but diversions can be used to channel excess water from higher soils.	Seasonal high water table; subject to ponding; fair to poor shear strength; moderate shrink-swell potential; medium to high compressibility.	Severe: slow permeability; seasonal high water table.	Severe: very poorly drained; seasonal high water table; subject to ponding.	Severe: very poorly drained; seasonal high water table; subject to ponding.
Soil features favorable.	Soil features favorable.	Fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Moderate: moderate permeability.	Moderate where slopes are 2 to 6 percent: moderate permeability. Severe where slopes are 6 to 12 percent: moderate permeability.	Slight.
Soil features favorable; generally not needed.	Soil features favorable; not needed.	Seasonal high water table; subject to flooding; fair to poor shear strength; low shrink-swell potential; medium to high compressibility.	Severe: seasonal high water table; subject to flooding; moderate permeability.	Severe: subject to flooding.	Severe: subject to flooding; somewhat poorly drained; seasonal high water table.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as source of—			Soil features affecting—			
	Topsoil	Sand and gravel	Road subgrade material	Highway location	Agricultural drainage	Farms ponds: Reservoir areas	Farms ponds: Embankments, dikes, and levees
Whitaker: Wh	Good in surface layer. Fair to poor in subsoil: moderately fine texture; seasonal high water table.	Not suitable.	Poor in subsoil: fair to poor shear strength; fair to poor compaction characteristics; moderate shrink-swell potential; subject to frost heave; fair stability; seasonal high water table. Fair to poor in substratum: fair to poor shear strength; poor compaction characteristics; medium compressibility; low shrink-swell potential; subject to frost heave; poor stability.	Seasonal high water table.	Seasonal high water table; moderate permeability; stratified silt and sand below depth of 36 inches.	Moderate seepage; seasonal high water table.	Fair stability in subsoil: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate shrink-swell potential; fair to poor shear strength. Poor stability in substratum: poor compaction characteristics; moderate permeability when compacted; medium compressibility; poor resistance to piping; low shrink-swell potential; fair to poor shear strength.
Xenia: XeA, XeB2.	Fair to good in surface layer. Fair to poor in subsoil: moderately fine texture.	Not suitable.	Fair to poor in subsoil and substratum: fair to poor shear strength; fair to poor compaction characteristics; medium to high compressibility; moderate to low shrink-swell potential; subject to frost heave; fair to poor stability.	Cuts and fills generally needed; subject to frost heave.	Natural drainage adequate; generally not needed.	Moderate to slow seepage.	Fair to poor stability in subsoil and substratum: fair to poor compaction characteristics; low permeability when compacted; medium to high compressibility; good resistance to piping; moderate to low shrink-swell potential; fair to poor shear strength.

[1] Not suitable if slope is more than 12 percent.

engineering properties—Continued

Soil features affecting—Continued			Degree and kind of limitation for—		
Grassed waterways	Terraces and diversions [1]	Foundations of buildings	Sewage disposal fields	Sewage lagoons	Sanitary landfills [2]
Soil features favorable.	Soil features favorable.	Seasonal high water table; fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Severe: moderate permeability; seasonal high water table.	Severe: stratified material at depth less than 5 feet allows for possible rapid seepage.	Severe: somewhat poorly drained; seasonal high water table; stratified silty and sandy material at depth less than 60 inches; hazard of free leachate flow to ground water.
Soil features favorable.	Soil features favorable.	Fair to poor shear strength; moderate to low shrink-swell potential; medium to high compressibility.	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.	Moderate: silty clay loam and clay loam texture moderately affects workability.

[2] Onsite study of the underlying strata, water tables, and hazards of aquifer pollution and drainage into ground water need to be made for landfills more than 5 to 6 feet deep.

Formation and Classification of the Soils

This section discusses the major factors of soil formation, the processes of soil formation as they relate to Hendricks County, and the system of classifying soils.

Factors of Soil Formation

The characteristics of a soil are determined by five factors: the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material.

Climate and plants and animals, but chiefly plants, are the active factors of soil formation. They act on parent material that has accumulated through the weathering of rocks and slowly bring about the formation of genetically related horizons. The effects of the climate and of plant and animal life are conditioned by relief. The parent material also affects the kind of soil profile that is formed, and in extreme cases determines it almost entirely. Finally, time is needed for changing the parent material into a soil profile. Some time is always required for differentiation of soil horizons, and generally a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for all five factors. Many of the processes of soil formation are unknown.

Parent material

The soils of Hendricks County formed mainly from three kinds of parent material; glacial drift, or ice-laid material; loess, or windblown silt; and alluvium, or water-laid deposits.

Glaciation has been important in the formation of the soils in Hendricks County. Ice sheets hundreds of miles long and thousands of feet thick covered this county during at least three different ice ages. From the oldest to the youngest, these glacial ice ages were the Kansan, the Illinoian, and the Wisconsin.

As the ice moved southward, it destroyed old hills and made new ones. The unconsolidated material that the ice carried buried old preglacial valleys (7). A mantle of rock, sand, silt, and clay was left when the ice sheets melted and receded. This material, collectively called glacial drift, is partly glacial till and partly outwash. Till is a heterogeneous deposit of sand, silt, clay, and gravel; and outwash is a water-laid deposit that consists mainly of sand and gravel.

Shortly after the glaciers receded, a dry period probably occurred. During this period, silt was blown from the west, probably from the Wabash River Valley, and some of this silt was deposited in Hendricks County. This windblown silt, or loess, ranges in thickness from 0 to more than 60 inches. The thicker deposits of it are in the western part of the county. The till deposited by the glaciers was gently sloping or undulating in many areas. When the loess was deposited, it filled many depressions in the till plain. In most places the loess made a nearly level surface by covering the undulating till.

Soil-forming processes started to work after the glacier receded northward. Most of the soils in the county formed in calcareous loam till. Miami soils are nearly level to moderately steep and are in close proximity to streams and creeks. Crosby soils are nearly level or gently sloping and Brookstone soils are nearly level or depressional. Hennepin soils are steep and very steep. In places the till is covered with a layer of loess less than 2 feet thick.

The soils that formed in glacial outwash materials are variable. Some soils formed in outwash that contains a considerable amount of sand and gravel. The outwash was deposited by melt water when the glacier receded. Fox and Ockley soils are soils that were derived partly in sand and gravel and partly in a finer textured loamy material over the sand and gravel.

When the melt water from the glacier decreased in velocity, it no longer carried coarse-textured sand and gravel but it did deposit silt and sand. Whitaker and Rensselaer are outwash soils that formed in this silt and sand. Most of these soils, especially the Rensselaer soils, formed in glacial sluiceways in the central and southern part of the county. A large level area of Rensselaer soils lies southeast of Stilesville. This area was at one time a glacial lake. Stratified sand that was the lake bottom occurs at depths of 3 to 7 feet. Finer textured silts and clay were blown and washed into the water and settled over the sand. Eventually the lake filled and remained a swamp until man cleared and drained it.

Formation of the soils in the western part of the county was strongly influenced by loess. The origin of the silt in that part of the county is mainly from loess, although there are some water-laid silts and in some areas a combination of the two. Ragsdale soils formed completely in loess. Fincastle, Russell, and Xenia soils formed partly in loess and partly in the underlying till.

Genesee and Shoals soils are on flood plains. These young soils formed in water-laid material, or alluvium. They received fresh deposits of alluvium during the frequent floods.

Climate

The climate of Hendricks County is midcontinental, and temperature varies widely from summer to winter. The climate is so uniform throughout the county that differences among the soils cannot be attributed to it.

Climate acting alone on parent material would be largely destructive. Rain and melting snow would wash soluble materials out of the soil. Thus, the processes of climate become constructive only when combined with the activities of plants and animals. Plants draw nutrients from the lower part of the soil; then, when the plants die, the nutrients are restored in varying degrees to the soil by the accumulation of decaying vegetation in the upper part. In Hendricks County the climate is such that leaching of plant nutrients progresses faster than replacement. This is why most of the soils are leached and acid in the subsoil.

The average annual rainfall is about 40 inches. It is well distributed throughout the year, but it is slightly heavier in spring and summer than in fall and winter.

Plant and animal life

Most of the soils in Hendricks County formed under a deciduous forest that consisted mainly of elm, maple, ash, oak, hickory, and poplar. In swampy areas the vegetation consisted of trees, swamp grasses, and sedges. These plants along with micro-organisms, earthworms, and other forms of life are important active forces in soil formation.

The plants, especially trees, take moisture and plant nutrients from the lower part of the soil and return the nutrients to the upper part when the plants decay. In wooded areas a layer of forest litter and leaf mold covers the soil. This layer is acted on by micro-organisms, earthworms, and other forms of life and by direct chemical action. As the organic matter decays, it releases organic acids that make the slowly soluble mineral materials more soluble. The rate of decay depends on climate, especially temperature and amount of moisture. The organic matter in dry wooded areas is thin, but that in swampy areas is thick. The swampy areas were covered with water most of the year, and consequently the organic matter accumulated instead of decaying or oxidizing.

Relief

Relief has had an important effect on the drainage and formation of the soils in Hendricks County. It influences soil formation by affecting internal drainage, runoff, depth to the water table, leaching, and accumulation or decay of organic matter. The relief in this county is predominantly level to gently sloping and is very steep only in a few small areas. It is a somewhat uneven plain with a general slope toward the south. The elevation above sea level ranges from 800 to 900 feet for most of the county, with a few points rising to about 1,000 feet (fig. 17).

Because of differences in relief, mainly through its effect on drainage, different kinds of soils formed from the same kind of parent material. As an example, Miami, Crosby, and Brookston soils all formed in the same kind of parent material. Miami soils are mostly gently sloping to moderately steep; they are well drained, are moderately permeable, and have a dark yellowish-brown subsoil. Crosby soils are nearly level or gently sloping. They are somewhat poorly drained, are slowly permeable, and have a yellowish brown, mottled subsoil. Brookston

Figure 17.—Ground moraine (background) northwest of Danville. This moderately sloping ridge is one of the higher points in the county.

soils formed in nearly level or depressional areas, are very poorly drained, are slowly permeable, and have a dark-colored surface layer and a gray to dark-gray, mottled subsoil.

Relief also affects erosion. In Hendricks County erosion is mainly caused by the runoff water that picks up soil particles and deposits them away from their original source. Water erosion of the nearly level soils in the county is slight because the water moves so slowly. It occurs more readily on the sloping soils because the water flow has greater velocity, and it can loosen and carry more soil particles. Although water erosion on the large level areas of the county is slight, fields that are not protected by cover can be affected by soil blowing.

Time

The length of time that soil material remains in place and is acted on by the soil-forming processes largely determines whether a soil is fully developed or mature or is undeveloped or young. Soils that formed in alluvium are young and show little or no profile development because fresh material is deposited periodically. Soils of this kind in the county are the Genesee and Shoals. Hennepin soils on very steep slopes are also young because geologic erosion removes the soil material as fast as it forms, and very rapid runoff leaves little water to percolate through the soil.

In Hendricks County there is little difference in the age of the mature soils and in the age of the parent materials in which they formed. These soils started forming when the glaciers receded. Mature soils have well-developed A and B horizons that are a result of the natural processes of soil formation.

Processes of Soil Formation

Several processes have been involved in the formation of the soils of this county. These processes are the accumulation of organic matter; the solution, transfer, and reprecipitation of calcium carbonates and bases; the liberation, reduction, and transfer of iron; and the formation and translocation of silicate clay minerals. In most soils more than one of these processes have been active in bringing about horizon differentiation.

Some organic matter has accumulated in the surface layer of all the soils of this county. The organic-matter content of some soils is low, but that of others is high. Generally soils, such as Ragsdale, that have the most organic matter have a thick, black surface layer.

Carbonates and bases have been leached from the upper horizons of nearly all the soils of this county. The leaching has had little direct effect on horizon differentiation but has had some indirect effect. The leaching is generally believed to precede the translocation of silicate clay minerals. Most of the well-drained soils have been leached of carbonates and bases. Even in the wettest soils some leaching is indicated by the absence of carbonates and by an acid reaction. Leaching of wet soils is slow because water moves slowly through the soil.

Clay particles accumulate in pores and form films on the surfaces along which water moves. Leaching of bases and translocation of silicate clays are among the more important processes in horizon differentiation in the soils of this county. Miami soils are examples of soils in which translocated silicate clays have accumulated in the B2t horizon in the form of clay films.

The reduction and transfer of iron, or gleying, has occurred in all of the very poorly drained and somewhat poorly drained soils of this county. In the naturally wet soils, this process has been significant in horizon differentiation. The gray color of the subsoil indicates the reduction of iron oxides. The reduction is commonly accompanied by some transfer of the iron, either from upper horizons to lower horizons or completely out of the profile. Mottles, which are in some horizons, indicate segregation of iron.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to each other and to the whole environment, and to develop principles that help us understand their behavior and their response to use. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Soils are classified into narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broader categories to facilitate study and comparison of large areas, such as countries and continents.

The system currently used to classify soils in the United States *(4)* was adopted for general use by the National Cooperative Soil Survey in 1965. This system is under continual study. Readers interested in the development of the system should refer to the available literature *(3)*.

The current system has six categories. Beginning with the broadest, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are observable or measureable. The properties are chosen, however, so that soils of similar genesis, or mode of origin, are grouped together.

Table 9 shows the classification of the soil series of Hendricks County into the broader categories of the system. The categories are defined briefly in the following paragraphs.

ORDER.—Ten soil orders are recognized: Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these soil orders are those that tend to give broad climatic groupings of soils. Two exceptions, Entisols and Histosols, occur in many different climates. Four of the orders are represented in Hendricks County: Entisols, Inceptisols, Mollisols, and Alfisols.

Entisols are recent soils; their original soil material or parent material has undergone little or no change, primarily because the material is so young or so resistant to weathering. Horizons are faint or not evident.

Inceptisols are light-colored mineral soils in which horizons have started to develop. These soils do not have

TABLE 9.—*Classification of soil series into higher categories*

Soil series	Current classification		
	Family	Subgroup	Order
Brookston	Fine-loamy, mixed, mesic	Typic Argiaquolls	Mollisols.
Crosby	Fine, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Fincastle	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Fox	Fine-loamy over sandy or sandy skeletal, mixed, mesic.	Typic Hapludalfs	Alfisols.
Genesee	Fine-loamy, mixed, mesic	Fluventic Eutrochrepts	Inceptisols.
Genesee, sandy variant	Coarse-loamy, mixed, mesic (sandy)	Fluventic Eutrochrepts	Inceptisols.
Hennepin	Fine-loamy, mixed, mesic	Typic Eutrochrepts	Inceptisols.
Mahalasville, clayey subsoil variant.	Fine, mixed, mesic	Typic Haplaquolls	Mollisols.
Martinsville	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Miami	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Ockley	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Ragsdale	Fine-silty, mixed, mesic	Typic Argiaquolls	Mollisols.
Rensselaer	Fine-loamy, mixed, mesic	Typic Argiaquolls	Mollisols.
Russell	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Shoals	Fine-loamy, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols.
Whitaker	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Xenia	Fine-silty, mixed, mesic	Aquic Hapludalfs	Alfisols.

traits that reflect soil mixing caused by shrinking and swelling.

Mollisols have formed under grass and have a thick, dark-colored surface layer containing colloids dominated by bivalent cations. The soil material in these soils has not been mixed by shrinking and swelling.

Alfisols are mineral soils that contain horizons of clay accumulation. Unlike the Mollisols, they lack a thick, dark-colored surface layer that contains colloids dominated by bivalent cations; but the base status of the lower horizons is not extremely low.

SUBORDER.—Each order is divided into suborders, primarily on the basis of the characteristics that seemed to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging or differences in climate or vegetation. The suborder is not shown in table 9.

GREAT GROUP.—Each suborder is divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus has accumulated or those that contain a pan that interferes with the growth of roots or movement of water. The features used are the self-mulching properties of clays, soil temperature, and major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium). The great group is not shown separately in table 9. The last word in the name of the subgroup, however, is the name of the great group.

SUBGROUP.—Each great group is divided into subgroups, one representing the central (typic) segment of the group, and others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. A subgroup may also be set up in an instance where soil properties intergrade outside of the range of any other great group, suborder, or order.

FAMILY.—Families are established within each subgroup primarily on the basis of properties important to the growth of plants or behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

SERIES.—The series is a group of soils that have major horizons that, except for texture of the surface layer, are similar in important characteristics and arrangement in the profile. They are given the name of a geographic location near the place where that series was first observed and mapped.

Climate of Hendricks County [4]

The climate of Hendricks County is characterized by wide variations in temperature from summer to winter and a fairly uniform distribution of precipitation throughout the year.

An occasional period of mild drought occurs in the summer when evaporation losses are high, and during that period monthly precipitation may decline to less than an inch. The very reliable precipitation in winter and early in spring when drying rates are low can cause some delay to farmers in completing spring plowing and planting.

Table 10 contains selected weather data collected at the Weather Bureau Station at Weir Cook Airport, Indianapolis. The weather at Weir Cook Airport is similar to that of Hendricks County.

The average date of the last freezing temperature in spring is about April 30. In 10 percent of the years, the last freeze occurs on or after May 12. In the fall the average date of the first freezing temperature is October 14. In 10 percent of the years, the first freezing tem-

[4] By LAWRENCE A. SCHAAL, State climatologist, U.S. Weather Service.

TABLE 10.—*Climatic*

[Data from Weather Bureau Station at

Month	Temperature			Precipitation				
	Average daily maximum	Average daily minimum	Average	Average total	Maximum in 24 hours	Snow and sleet		
						Average total	Monthly maximum	Maximum in 24 hours
	°F.	°F.	°F.	Inches	Inches	Inches	Inches	Inches
January	37. 1	21. 0	29. 1	3. 05	3. 47	4. 8	17. 0	10. 3
February	39. 4	22. 8	31. 1	2. 28	2. 32	5. 0	15. 3	12. 5
March	48. 1	29. 7	38. 9	3. 41	3. 05	3. 7	10. 1	5. 6
April	61. 2	40. 3	50. 8	3. 74	2. 56	0. 5	4. 0	3. 1
May	72. 0	50. 7	61. 4	3. 99	3. 53	(1)	(1)	(1)
June	81. 8	60. 4	71. 1	4. 62	3. 80	0. 0	0. 0	0. 0
July	86. 0	64. 3	75. 2	3. 50	3. 75	0. 0	0. 0	0. 0
August	84. 7	62. 7	73. 7	3. 03	2. 72	0. 0	0. 0	0. 0
September	78. 0	54. 9	66. 5	3. 24	3. 07	0. 0	0. 0	0. 0
October	66. 8	44. 0	55. 4	2. 62	3. 90	(1)	1. 2	1. 2
November	50. 0	31. 8	40. 9	3. 09	3. 02	2. 1	8. 3	8. 2
December	39. 0	23. 2	31. 1	2. 68	1. 88	4. 2	8. 2	5. 6
Year	62. 0	42. 2	52. 1	39. 25	3. 90	20. 3	17. 0	12. 5

[1] Trace, an amount too small to measure.

perature comes on or before September 30. The average length of the growing season is 167 days.

The probability of a 2-inch rain in 1 hour is once every 9 years. A 1-inch rain in a 30-minute period occurs about every other year. The probability of other rainfall rates may be derived from the table. Soil erosion is related to these heavy rains.

Additional Facts About the County

The first settlement of Hendricks County was in 1820 along the lower part of White Lick Creek. The southern part of the county developed much more rapidly than the northern part, mainly because of better natural drainage and the completion of the National Road through this section in 1830. It wasn't until about 1880 that the wet flat areas were artificially drained. Since then drainage systems have been extended, and now practically all areas are suitable for farming.

In the past few years Hendricks County has experienced rapid growth and a change from an essentially rural area to an area of expanding housing and light industry. The population increased by about 50 percent between 1960 and 1970. The most rapid change has taken place on the east side of the county.

Farming is an important enterprise and provides a relatively large part of the total income in the county. Family operated farms are predominant. The main income is from row crops, small grains, and livestock. In 1969, 1,408 farms were in the county, and 215,306 acres were farmland.

Transportation via highway, railroad, and air is available in the county. Four federal highways, three interstate highways, and seven state highways cross Hendricks County. Also six railroads cross it from east to west, all radiating from Indianapolis. County roads are numerous and excellent, and most are hard surfaced. The commercial airport in Indianapolis is just east of Hendricks County. In addition to this, several small private or municipal airfields are in the county.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

data

Indianapolis, Indiana, elevation 792 feet]

Wind		Possible sunshine	Average number of days (sunrise to sunset) that are—			Average number of days on which maximum temperature reaches—	
Average speed	Prevailing direction		Clear	Partly cloudy	Cloudy	90° F. or higher	32° F. or lower
Miles per hour		*Percent*					
11. 3	NW	41	6	6	19	0	13
11. 2	WNW	52	6	6	16	0	9
12. 0	WNW	52	6	7	18	0	4
11. 7	SW	55	6	7	17	0	0
9. 8	SW	62	7	9	15	1	0
8. 4	SW	69	7	11	12	5	0
7. 4	SW	71	9	12	10	6	0
7. 2	SW	73	9	13	9	4	0
8. 2	SW	69	11	9	10	3	0
9. 1	SW	67	12	8	11	0	0
10. 9	SW	45	7	7	16	0	1
10. 7	SW	42	6	5	20	0	11
9. 8	SW	59	92	100	173	18	38

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Bottom land. The flood plain of a stream; frequently or occasionally flooded unless protected artificially.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Coarse-textured soil. Soil of the sand or loamy sand textural class.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Fine-textured soil. Soil of the sandy clay, silty clay, or clay textural class.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Glacial drift. Rock material transported by glacial ice and then deposited; also includes the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash. Cross-bedded gravel, sand, and silt deposited by melt water as it flowed from glacial ice.

Glacial till. Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, and covered with grass for protection against erosion; used to conduct suface water away from cropland.

Gravel. Rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.

Habitat. The natural abode of a plant or animal; it refers to the kind of environment in which a plant or animal normally lives as opposed to its range, or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Irrigation. Application of water to soils to assist in production of crops.

Leaching. The removal of soluble materials from soils or other materials by percolating water.

Loess. Fine-grained material, dominantly of silt-sized particles, that has been deposited by wind.

Medium-textured soil. Soil of the very fine sandy loam, loam, silt loam, or silt textural class.

Moderately coarse textured soil. Soil of the sandy loam or fine sandy loam textural class.

Moderately fine textured soil. Soil of the clay loam, sandy clay loam, or silty clay loam textural class.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Muck. An organic soil, consisting of fairly well decomposed plant remains, that is relatively high in mineral content, finely divided, and dark in color. Muck is shown as a separate mapping unit on the soil map of Hendricks County, because the total acreage is small (less than 10 acres) and the individual areas are generally less than 2½ acres in size. Symbols on the soil map show where areas of muck are located within areas of other soils. The areas of muck are in depressions, mostly on the bottom lands at the base of terraces and uplands. The organic material is more than 40 inches thick. Drainage is very poor.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation a 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Runoff. That part of precipitation upon a drainage area that is discharged from the area in stream channels. The part that flows off the surface without sinking in is called surface runoff; the part that enters the ground before reaching surface streams is called ground water runoff or seepage flow from ground water.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter; *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *mas-*

sive (the particles adhering together without any regular cleavage, as in many claypans and hardpans.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland. Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Windbreak. A strip of closely spaced trees or shrubs, planted primarily to deflect wind currents and thereby control soil blowing and snow drifting, conserve moisture, and protect crops, orchards, livestock, and buildings.

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GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Acreage and extent, table 1, page 10.
Predicted yields, table 2, page 30.
Trees and shrub suitability, table 3, page 31.
Limitations of soils for recreational uses, table 4, page 36.
Interpretations for wildlife habitat, table 5, page 38.
Engineering uses of the soils, tables 6, 7, and 8, pages 42 through 61.

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Tree and shrub suitability group Number
Br	Brookston silt loam, overwash	9	IIw-1	26	1
Bs	Brookston silty clay loam	9	IIw-1	26	1
CrA	Crosby silt loam, 0 to 3 percent slopes	10	IIw-2	26	2
CsB2	Crosby-Miami silt loams, 2 to 6 percent slopes, eroded	11	IIe-12	26	2
FcA	Fincastle silt loam, 0 to 3 percent slopes	12	IIw-2	26	2
FoA	Fox loam, 0 to 2 percent slopes	13	IIs-1	27	3
FoB2	Fox loam, 2 to 6 percent slopes, eroded	13	IIe-9	26	3
FoC2	Fox loam, 6 to 12 percent slopes, eroded	13	IIIe-9	28	3
FxC3	Fox clay loam, 6 to 12 percent slopes, severely eroded	13	IVe-9	29	3
Gn	Genesee silt loam	14	I-2	25	3
Gs	Genesee sandy loam, sandy variant	14	I-2	25	3
HeF	Hennepin loam, 25 to 50 percent slopes	15	VIIe-2	29	4
Mc	Mahalasville silty clay loam, clayey subsoil variant	15	IIw-1	26	1
MeA	Martinsville loam, 0 to 2 percent slopes	16	I-1	25	3
MeB2	Martinsville loam, 2 to 6 percent slopes, eroded	16	IIe 3	26	3
MmB2	Miami silt loam, 2 to 6 percent slopes, eroded	17	IIe-1	25	3
MmC2	Miami silt loam, 6 to 12 percent slopes, eroded	17	IIIe-1	27	3
MmD2	Miami silt loam, 12 to 18 percent slopes, eroded	17	IVe-1	28	3
MmE2	Miami silt loam, 18 to 25 percent slopes, eroded	17	VIe-1	29	4
MsB3	Miami clay loam, 2 to 6 percent slopes, severely eroded	17	IIIe-1	27	3
MsC3	Miami clay loam, 6 to 12 percent slopes, severely eroded	18	IVe-1	28	3
MsD3	Miami clay loam, 12 to 18 percent slopes, severely eroded	18	VIe-1	29	3
OcA	Ockley silt loam, 0 to 2 percent slopes	19	I-1	25	3
OcB2	Ockley silt loam, 2 to 6 percent slopes, eroded	20	IIe-3	26	3
OsA	Ockley silt loam, loamy substratum, 0 to 2 percent slopes	20	I-1	25	3
OsB2	Ockley silt loam, loamy substratum, 2 to 6 percent slopes, eroded	20	IIe-3	26	3
Ra	Ragsdale silty clay loam	20	IIw-1	26	1
Rn	Rensselaer clay loam	21	IIw-1	26	1
RuB2	Russell silt loam, 2 to 6 percent slopes, eroded	22	IIe-3	26	3
RuC2	Russell silt loam, 6 to 12 percent slopes, eroded	22	IIIe-3	28	3
Sh	Shoals silt loam	22	IIw-7	27	2
Wh	Whitaker silt loam	23	IIw-2	26	2
XeA	Xenia silt loam, 0 to 2 percent slopes	24	I-1	25	3
XeB2	Xenia silt loam, 2 to 6 percent slopes, eroded	24	IIe-3	26	3

Accessibility Statement

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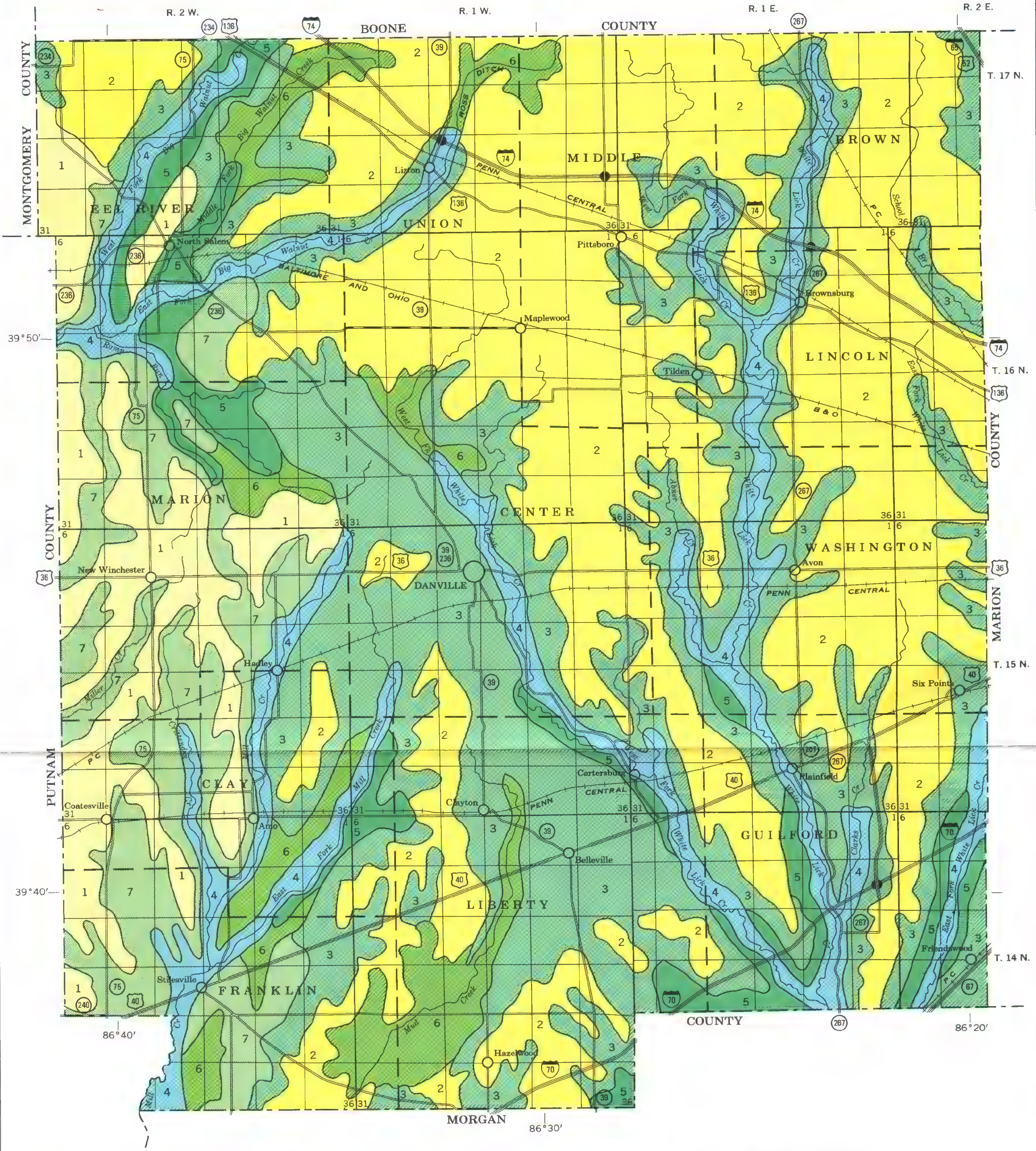


SOIL ASSOCIATIONS *

- **1** Fincastle-Ragsdale association: Deep, somewhat poorly drained and very poorly drained, nearly level and gently sloping, medium-textured and moderately fine textured soils formed in silt-mantled glacial till on uplands
- **2** Crosby-Brookston association: Deep, somewhat poorly drained and very poorly drained, nearly level and gently sloping, medium-textured and moderately fine textured soils formed in glacial till on uplands
- **3** Miami-Crosby association: Deep, well drained and somewhat poorly drained, nearly level to moderately steep, medium-textured and moderately fine textured soils formed in glacial till on uplands
- **4** Genesee-Shoals association: Deep, well drained and somewhat poorly drained, nearly level, medium-textured soils formed in alluvium on bottom lands
- **5** Ockley-Martinsville-Fox association: Well drained, nearly level to moderately sloping, medium-textured and moderately fine textured soils that are deep to moderately deep over sand and gravel; formed in glacial outwash on outwash plains
- **6** Rensselaer-Whitaker association: Deep, very poorly drained and somewhat poorly drained, nearly level, moderately fine textured and medium textured soils formed in glacial outwash on outwash plains, in sluiceways, and in old lakebeds
- **7** Xenia-Russell-Miami association: Deep, moderately well drained and well drained, nearly level to moderately steep, medium-textured and moderately fine textured soils formed in silt-mantled glacial till on uplands

* Texture refers to the surface layer of the major soils of each association.

Compiled 1972

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

HENDRICKS COUNTY, INDIANA

Scale 1 : 126,720

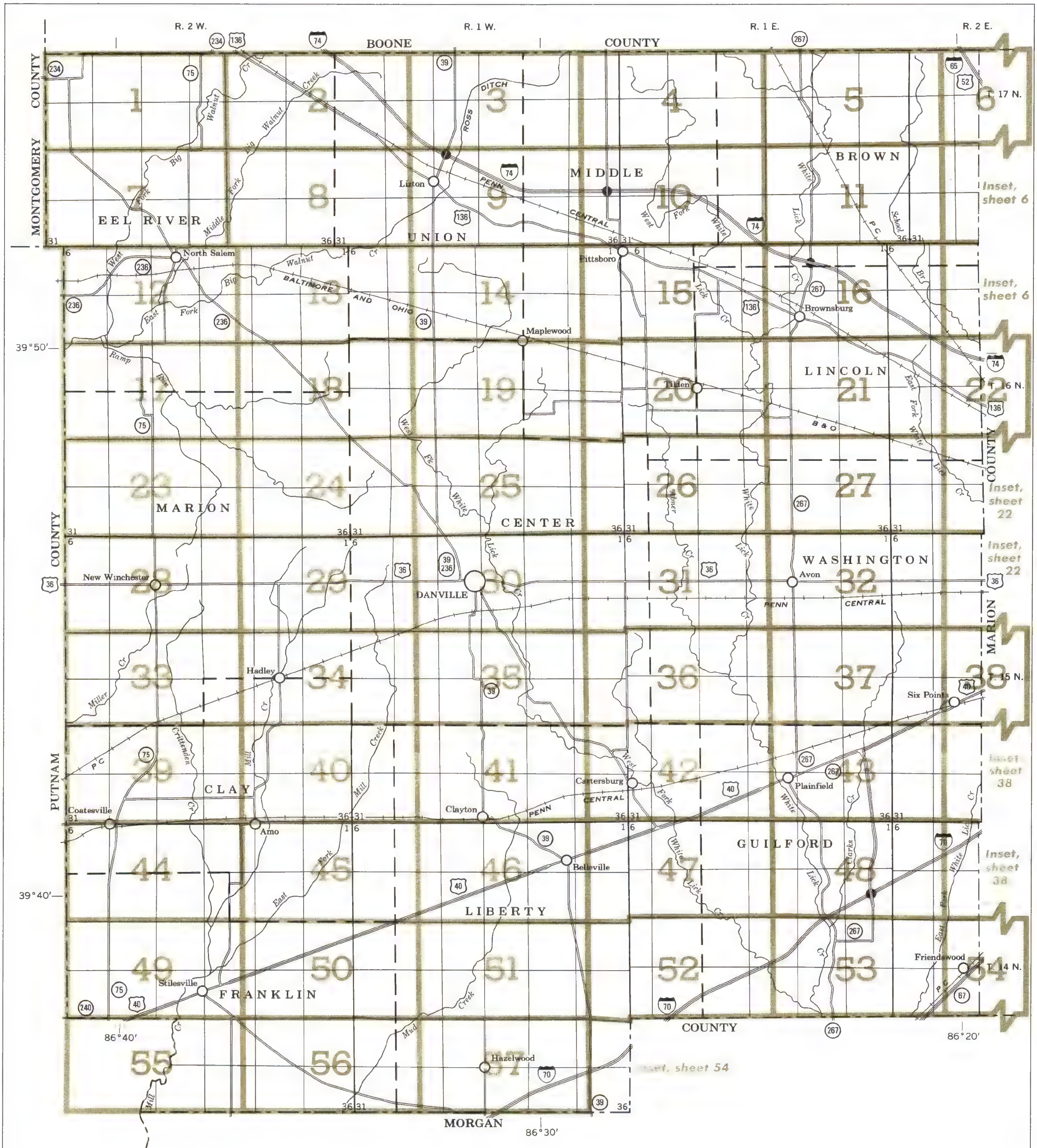
1 0 1 2 3 4 Miles

N

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36



INDEX TO MAP SHEETS

HENDRICKS COUNTY, INDIANA

Scale 1:126,720

1 0 1 2 3 4 Miles

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND

Each soil symbol consists of 2 or 3 letters, for example Br, CrA, or FcA. If slope is given in the soil name, the third letter, A, B, C, D, E, or F, indicates the class of slope. Symbols without a slope letter are those of nearly level soils. A final number 2 or 3 in the symbol indicates that the soil is eroded or severely eroded respectively.

SYMBOL	NAME
Br	Brookston silt loam, overwash
Bs	Brookston silty clay loam
CrA	Crosby silt loam, 0 to 3 percent slopes
CsB2	Crosby-Miami silt loams, 2 to 6 percent slopes, eroded
FcA	Fincastle silt loam, 0 to 3 percent slopes
FoA	Fox loam, 0 to 2 percent slopes
FoB2	Fox loam, 2 to 6 percent slopes, eroded
FoC2	Fox loam, 6 to 12 percent slopes, eroded
FxC3	Fox clay loam, 6 to 12 percent slopes, severely eroded
Gn	Genesee silt loam
Gs	Genesee sandy loam, sandy variant
HeF	Hennepin loam, 25 to 50 percent slopes
Mc	Mahalasville silty clay loam, clayey subsoil variant
MeA	Martinsville loam, 0 to 2 percent slopes
MeB2	Martinsville loam, 2 to 6 percent slopes, eroded
MmB2	Miami silt loam, 2 to 6 percent slopes, eroded
MmC2	Miami silt loam, 6 to 12 percent slopes, eroded
MmD2	Miami silt loam, 12 to 18 percent slopes, eroded
MmE2	Miami silt loam, 18 to 25 percent slopes, eroded
MsB3	Miami clay loam, 2 to 6 percent slopes, severely eroded
MsC3	Miami clay loam, 6 to 12 percent slopes, severely eroded
MsD3	Miami clay loam, 12 to 18 percent slopes, severely eroded
OcA	Ockley silt loam, 0 to 2 percent slopes
OcB2	Ockley silt loam, 2 to 6 percent slopes, eroded
OsA	Ockley silt loam, loamy substratum, 0 to 2 percent slopes
OsB2	Ockley silt loam, loamy substratum, 2 to 6 percent slopes, eroded
Ra	Ragsdale silty clay loam
Rn	Rensselaer clay loam
RuB2	Russell silt loam, 2 to 6 percent slopes, eroded
RuC2	Russell silt loam, 6 to 12 percent slopes, eroded
Sn	Shoals silt loam
Wn	Whitaker silt loam
XeA	Xenia silt loam, 0 to 2 percent slopes
XeB2	Xenia silt loam, 2 to 6 percent slopes, eroded

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Divided
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

Located object

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
- Unclassified

Canals and ditches

Lakes and ponds
- Perennial (water, w)
- Intermittent (int)

Spring

Marsh or swamp

Wet spot

Drainage end or alluvial fan

RELIEF

Escarpments
- Bedrock
- Other

Short steep slope

Prominent peak

Depressions (Large, Small)
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

- Soil boundary (Dx)
- and symbol
- Gravel
- Stones: Stony; Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully
- Muck

HENDRICKS COUNTY, INDIANA NO. 1

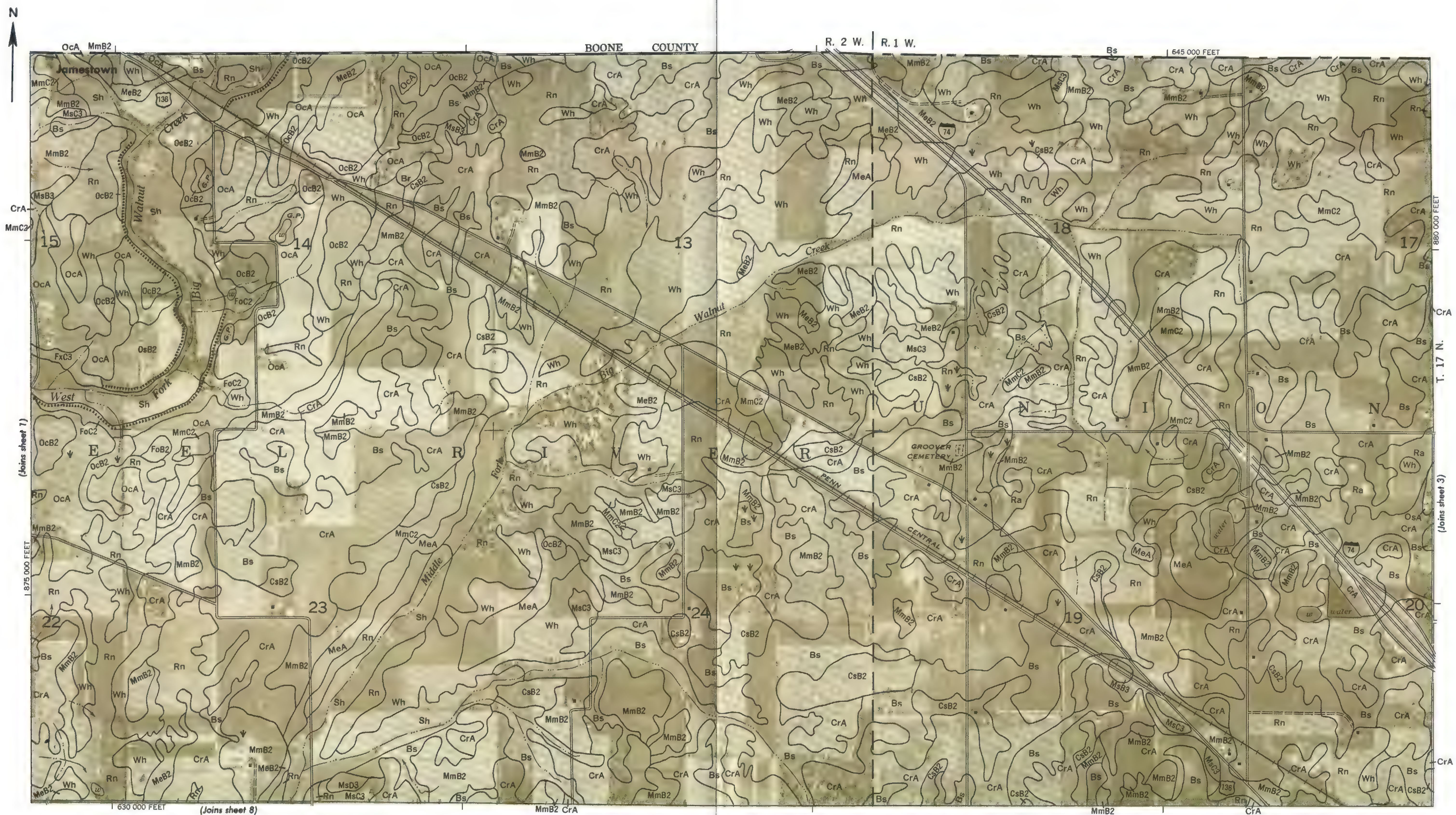
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.



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HENDRICKS COUNTY, INDIANA NO. 2

HENDRICKS COUNTY, INDIANA NO. 3

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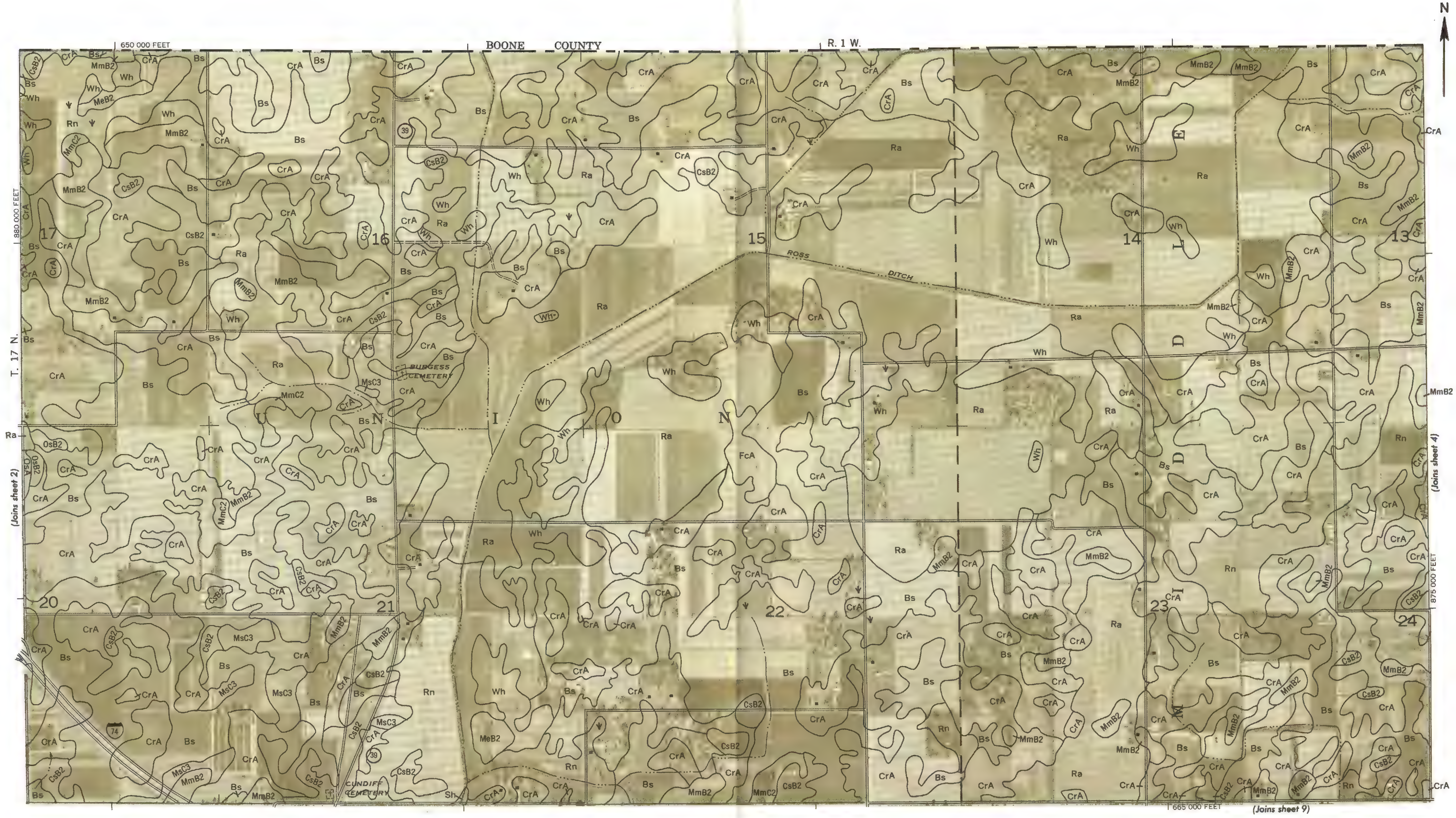

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

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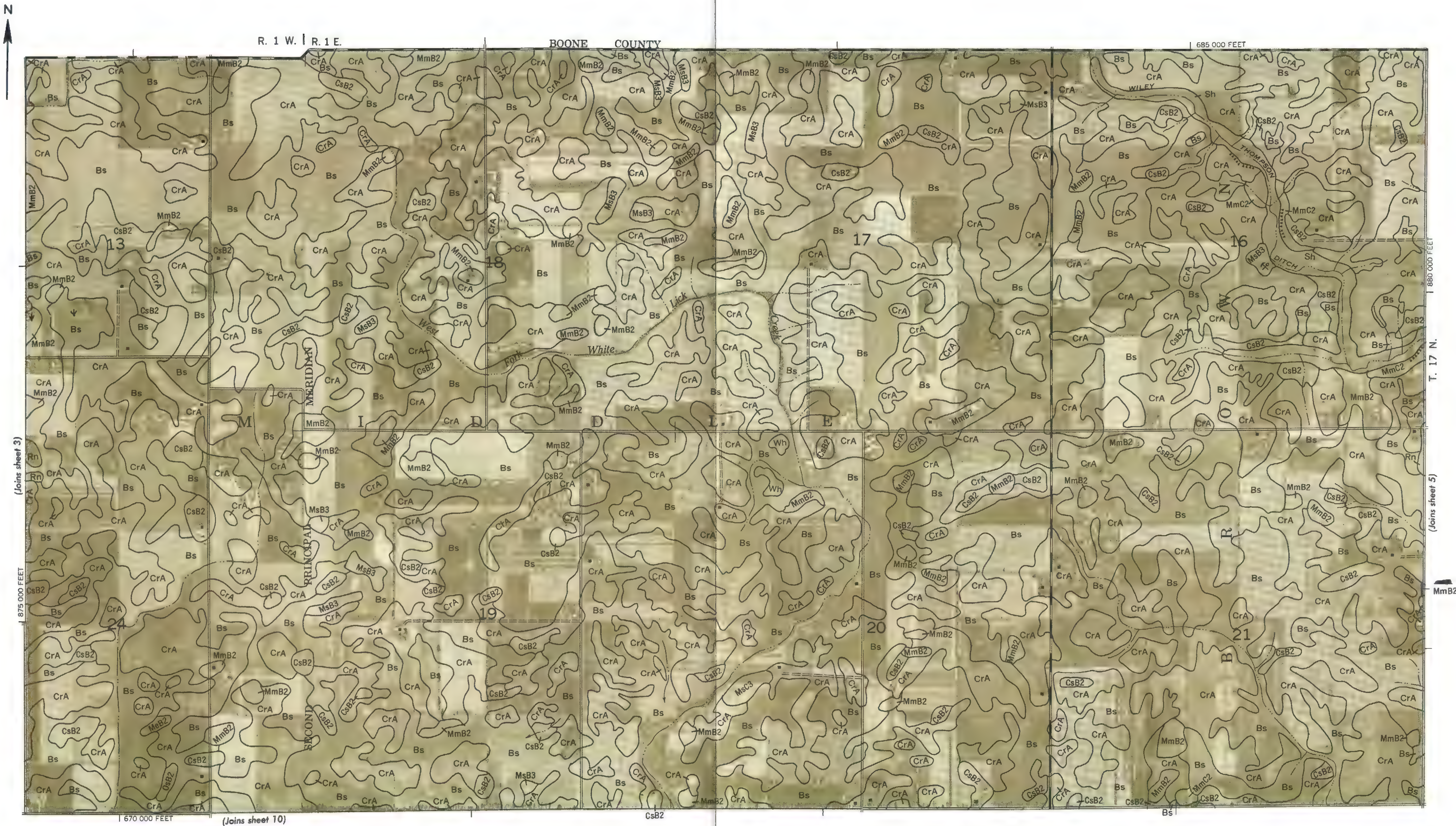
HENDRICKS COUNTY, INDIANA — SHEET NUMBER 4



1 ¾ ½ ¼ 0 1 Mile

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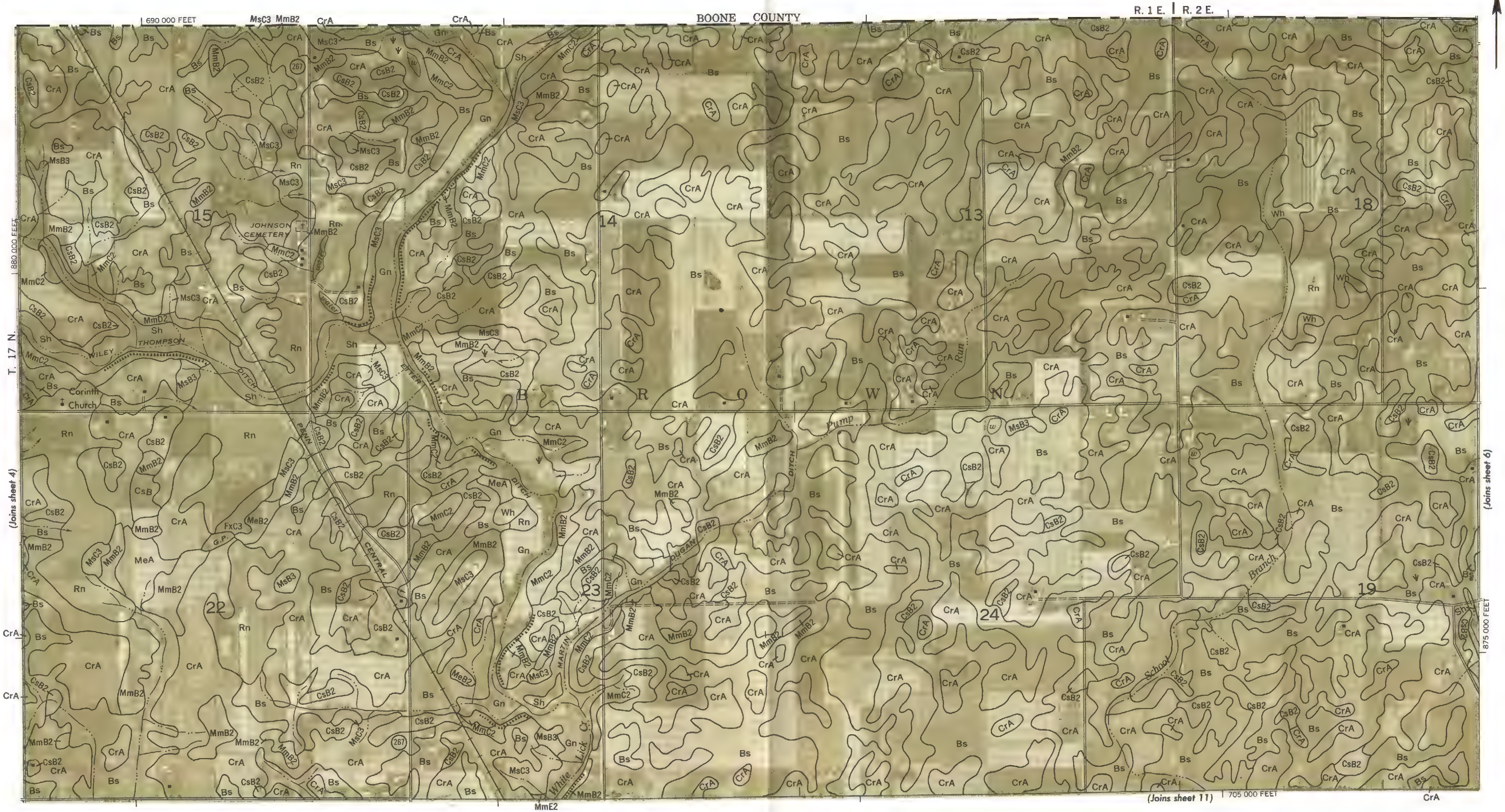

HENDRICKS COUNTY, INDIANA NO. 5

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Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 6

2000 AND 5000-FOOT GRID TICKS

INSET A

2000 AND 5000-FOOT GRID TICKS

INSET B

2000 AND 5000-FOOT GRID TICKS

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

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HENDRICKS COUNTY, INDIANA NO. 7

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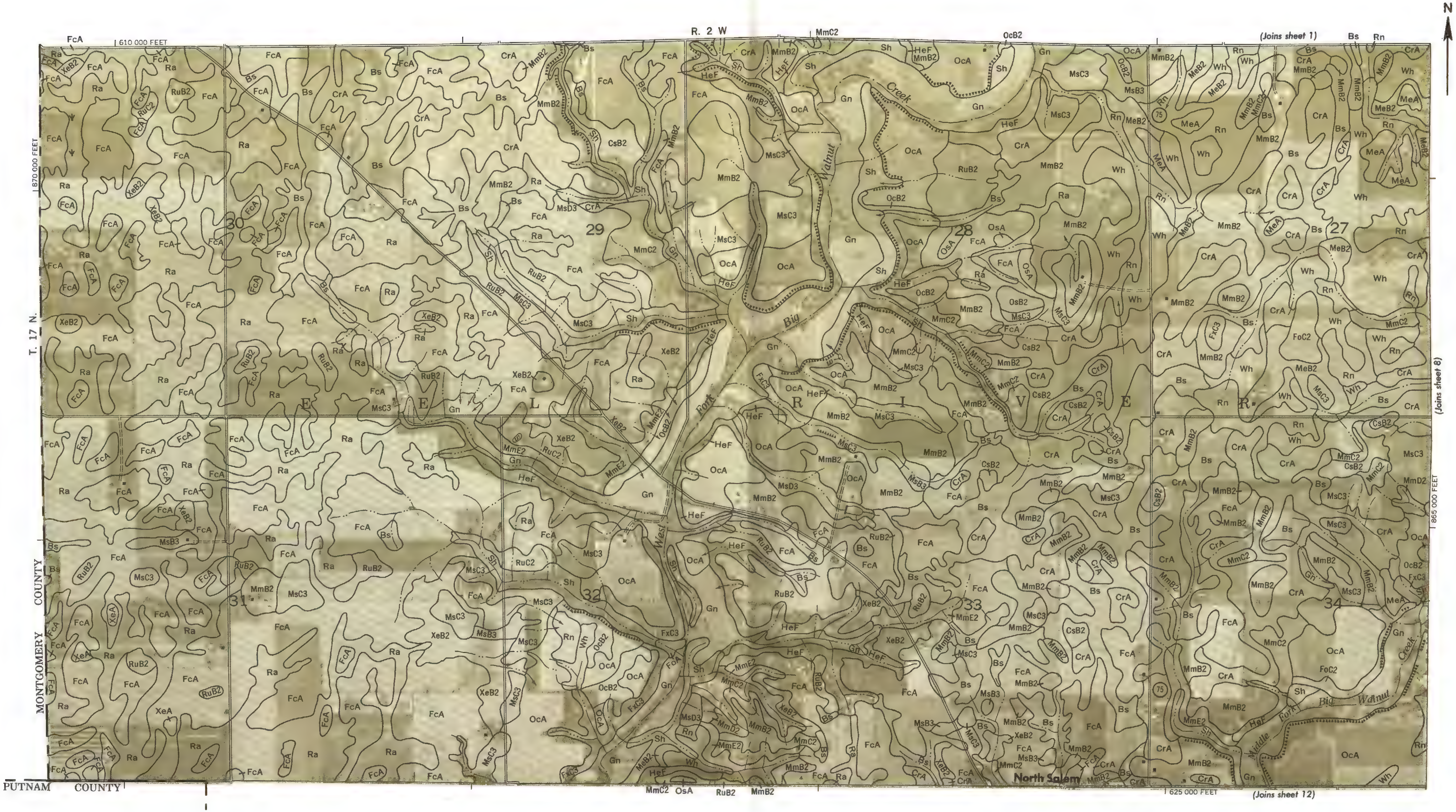

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 8

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HENDRICKS COUNTY, INDIANA NO. 8

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA NO. 9

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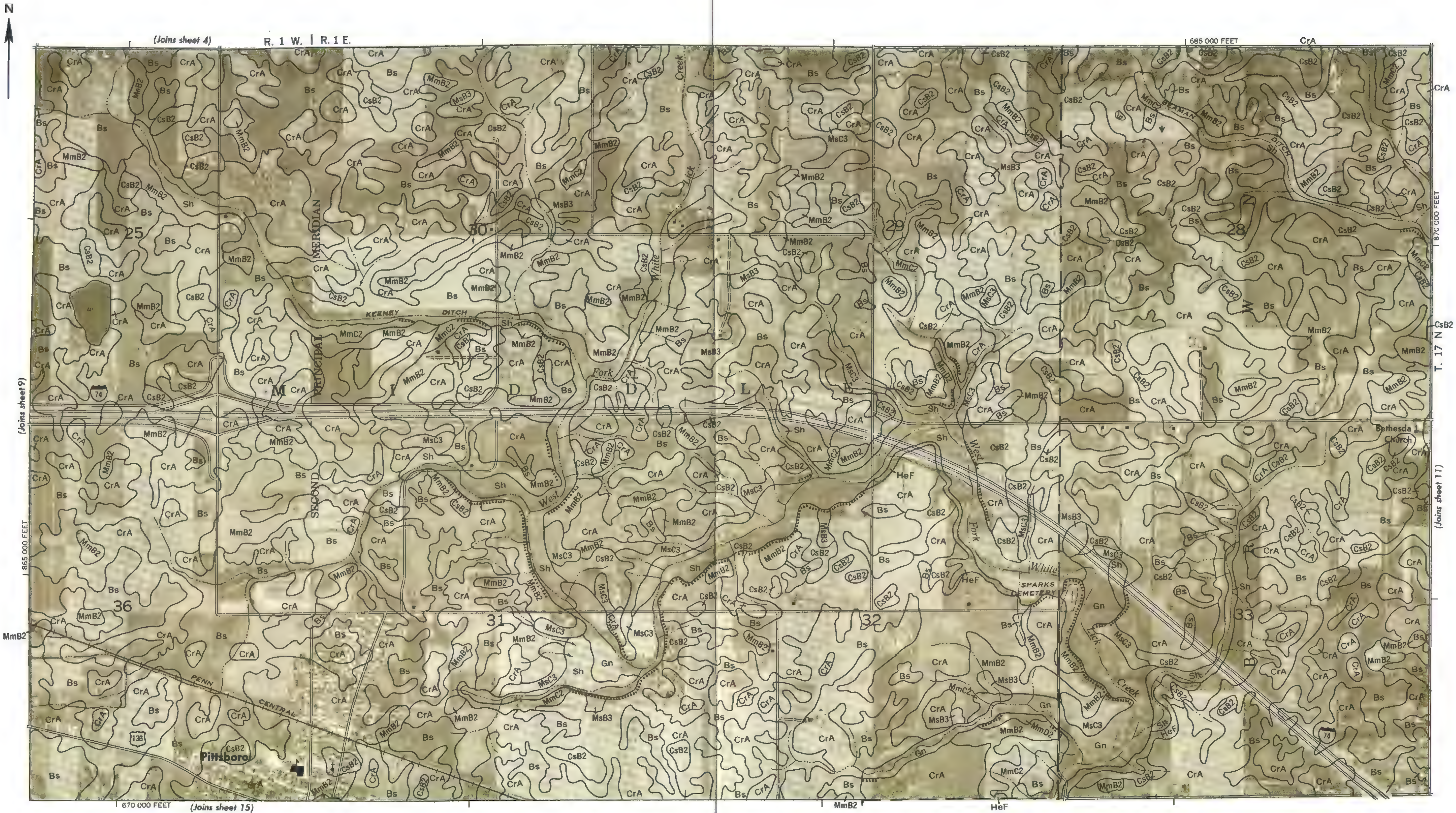
1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

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HENDRICKS COUNTY, INDIANA NO. 10

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HENDRICKS COUNTY, INDIANA NO. 11

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HENDRICKS COUNTY, INDIANA — SHEET NUMBER 12

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HENDRICKS COUNTY, INDIANA — NO. 12

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA NO. 13

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Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 14

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Land division corners are approximately positioned on this map.

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HENDRICKS COUNTY, INDIANA NO. 15

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Land division corners are approximately positioned on this map.

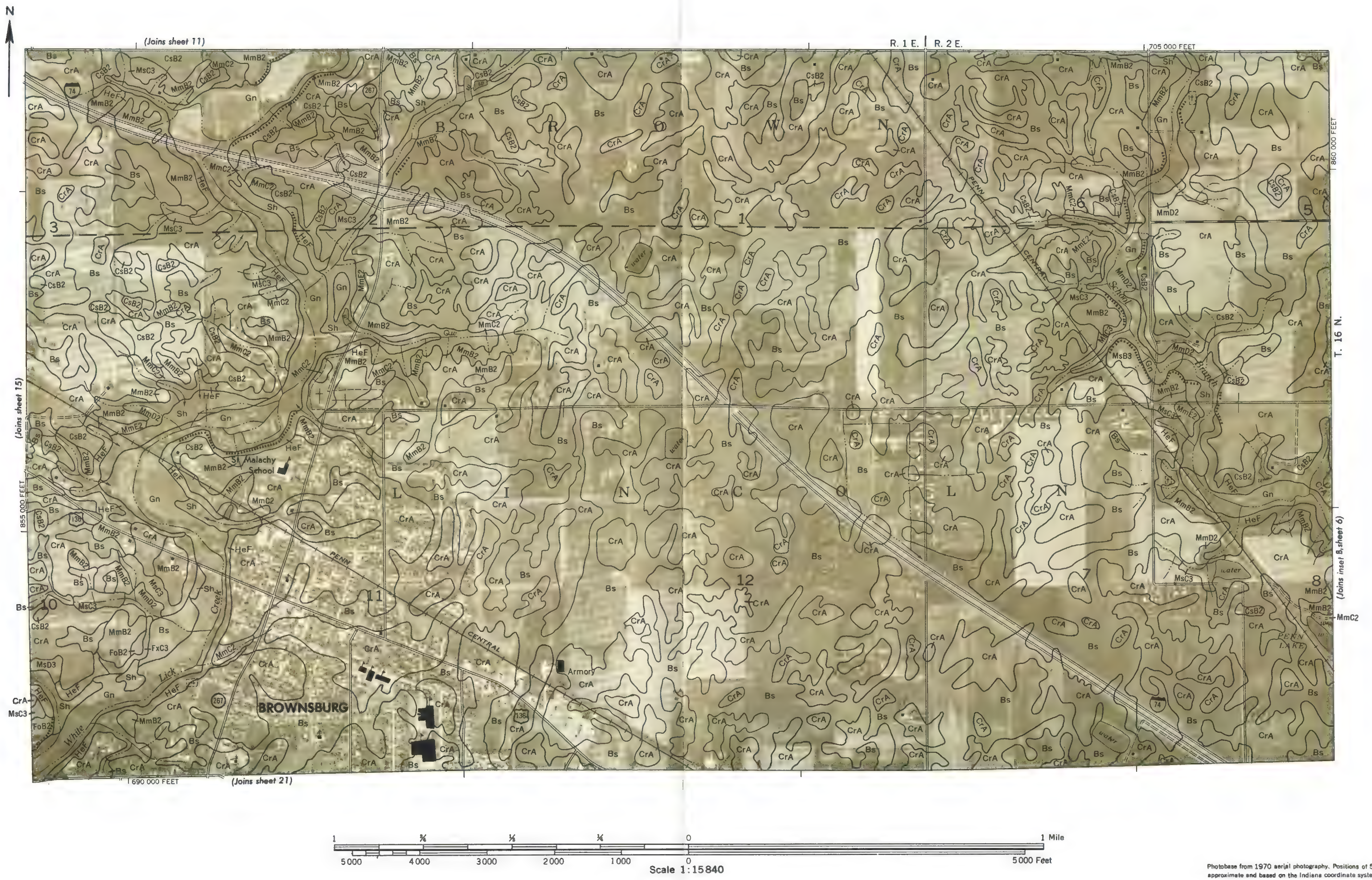
1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 16



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HENDRICKS COUNTY, INDIANA NO. 16

HENDRICKS COUNTY, INDIANA NO. 17

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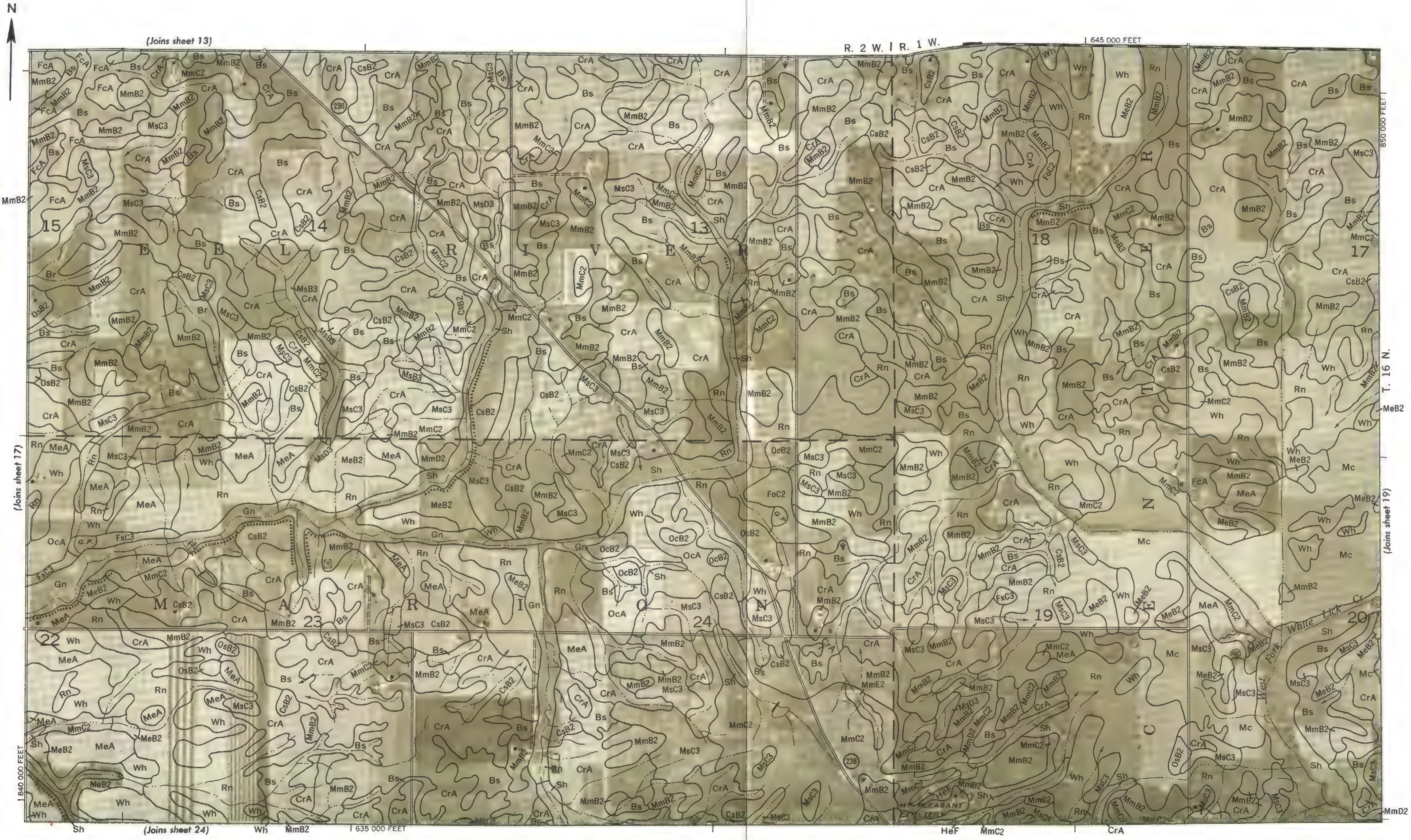
1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 18



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

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HENDRICKS COUNTY, INDIANA NO. 18

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HENDRICKS COUNTY, INDIANA NO. 19

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1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 20

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

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HENDRICKS COUNTY, INDIANA NO. 21

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Land division corners are approximately positioned on this map.

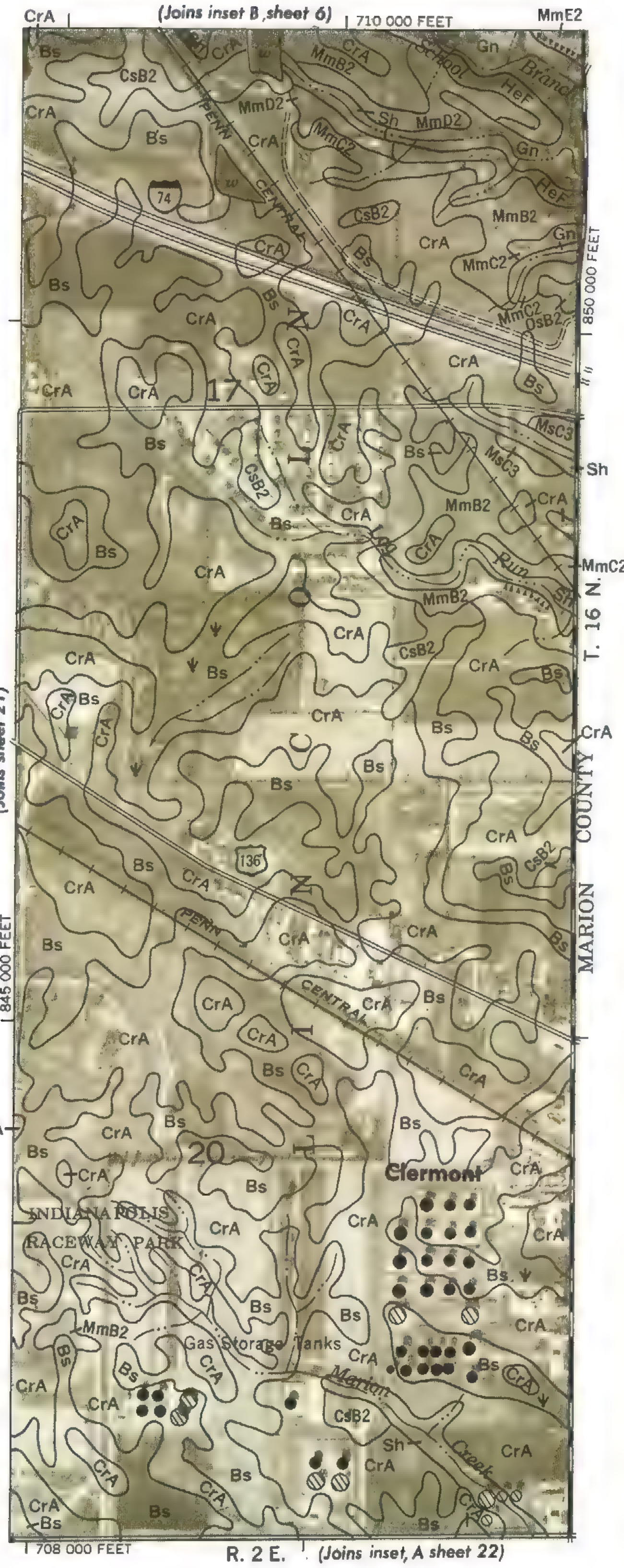
1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 22

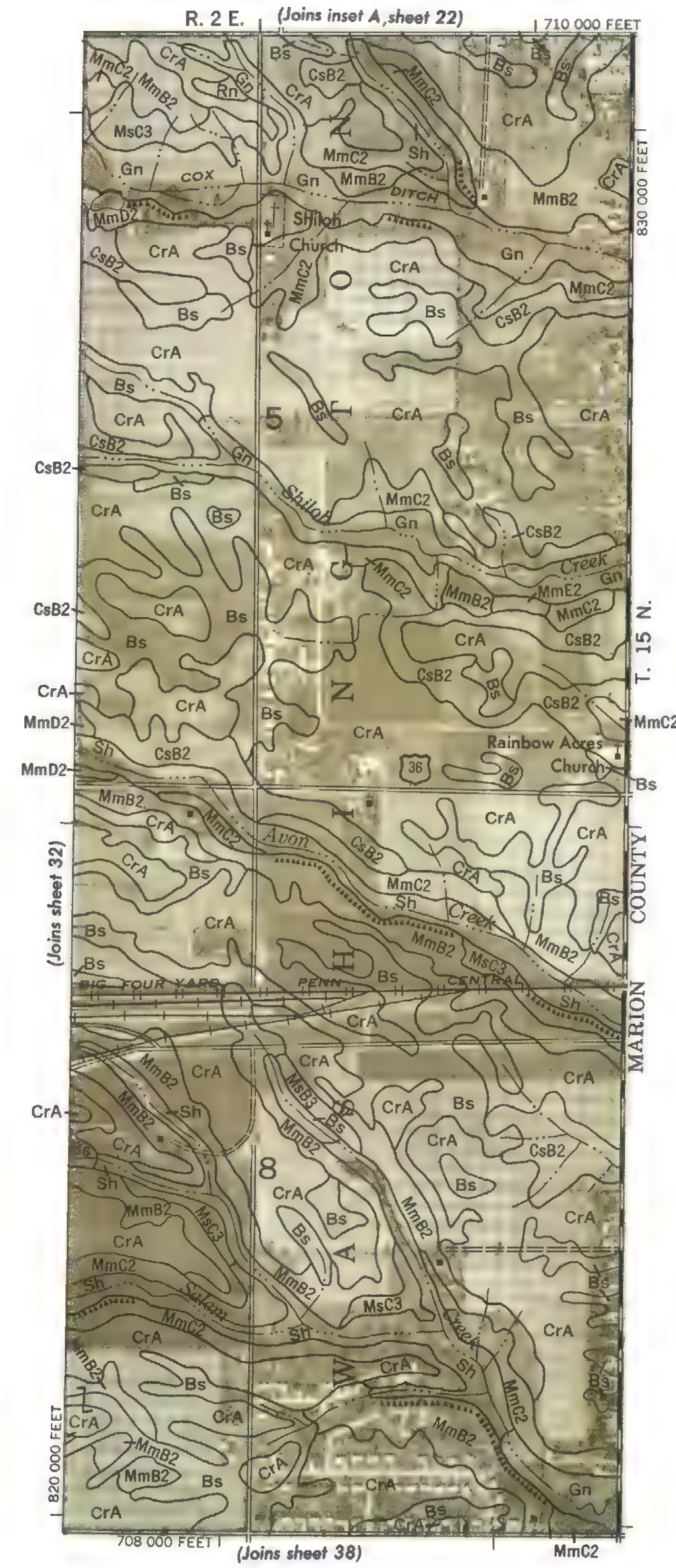


2000 AND 5000-FOOT GRID TICKS

INSET A

2000 AND 5000-FOOT GRID TICKS

INSET B



2000 AND 5000-FOOT GRID TICKS

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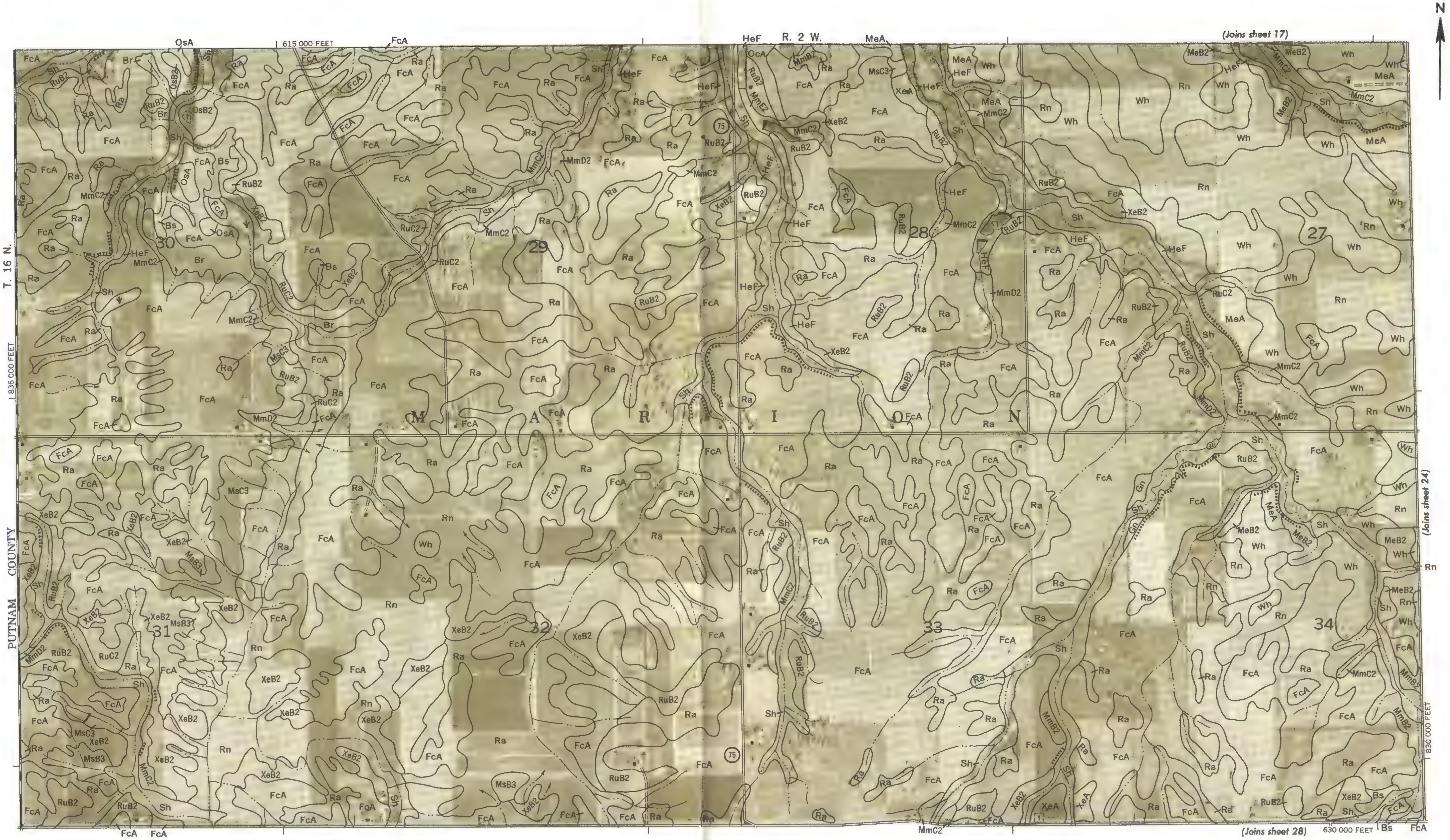

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

HENDRICKS COUNTY, INDIANA NO. 23

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Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 24

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

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HENDRICKS COUNTY, INDIANA NO. 24

HENDRICKS COUNTY, INDIANA NO. 25

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Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 26

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HENDRICKS COUNTY, INDIANA NO. 27

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Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

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1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

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HENDRICKS COUNTY, INDIANA NO. 28

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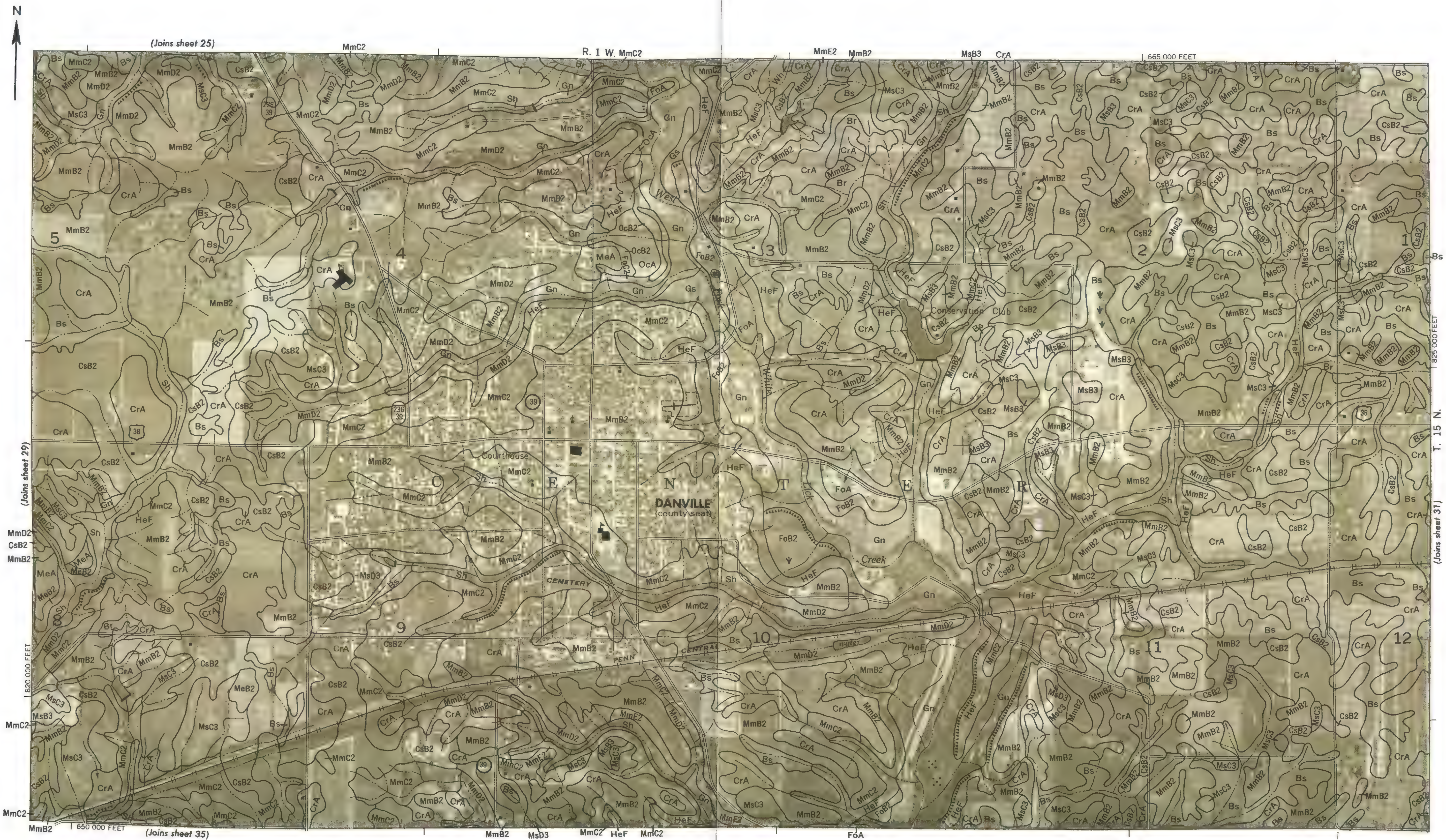
1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 30



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 31

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

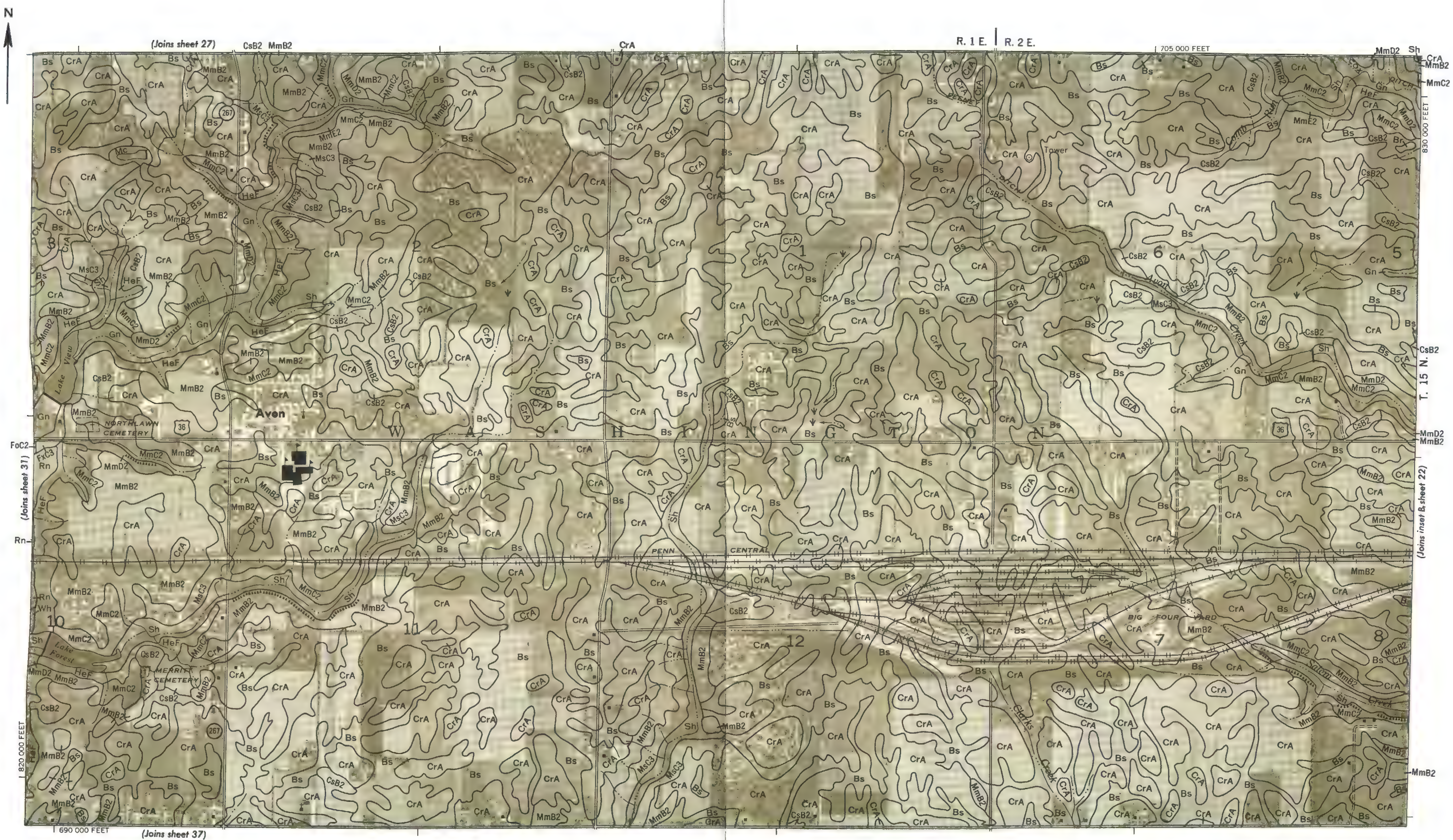
1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 32



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15 840

HENDRICKS COUNTY, INDIANA NO. 33

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

1 ½ ¼ ¼ 0 1 Mile
5000 4000 3000 2000 1000 0 5000 Feet
Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 35

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

1 ¾ ½ ¼ 0 1 Mile

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

Scale 1:15 840

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

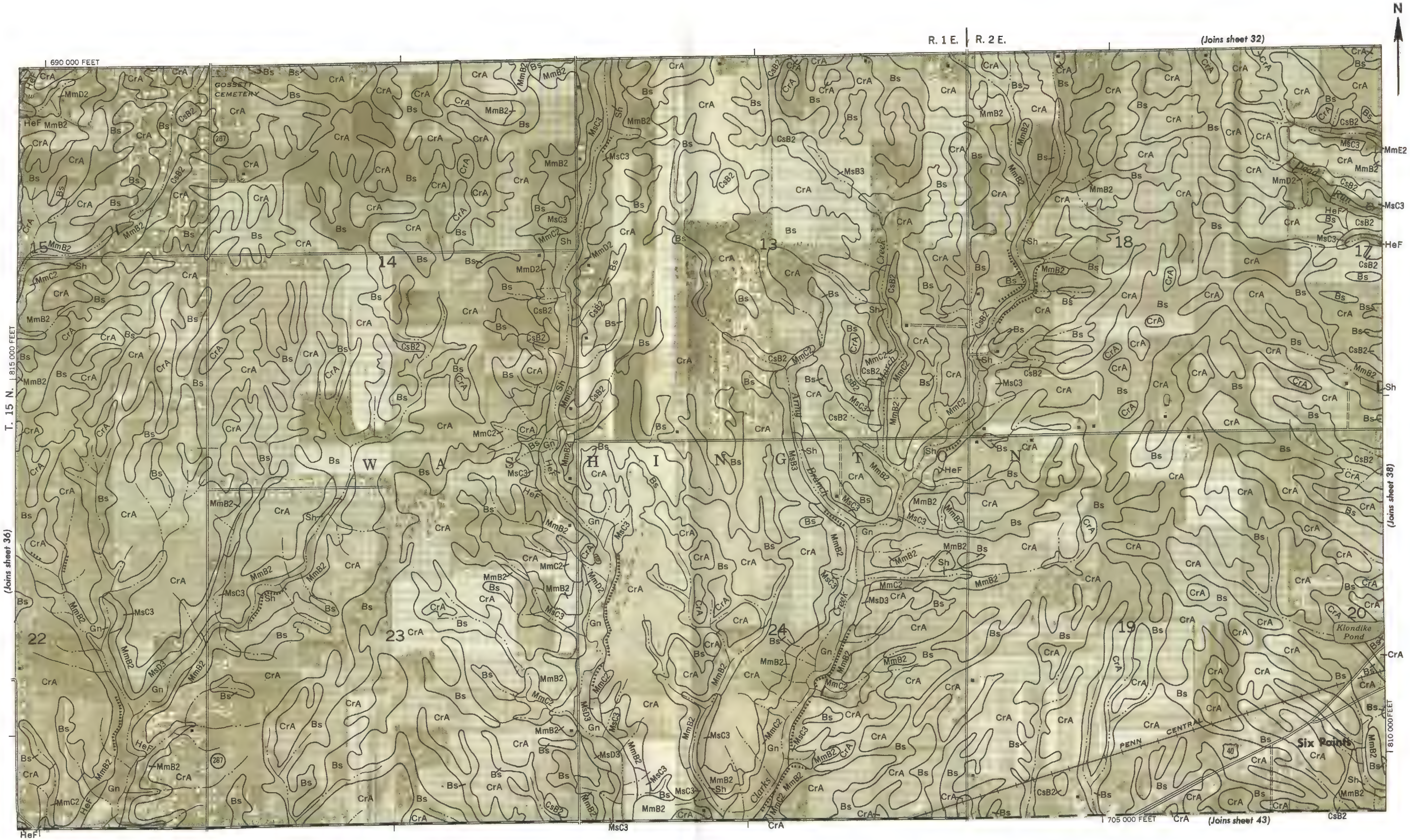
HENDRICKS COUNTY, INDIANA NO. 36

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA NO. 37

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.

Land division corners are approximately positioned on this map.



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

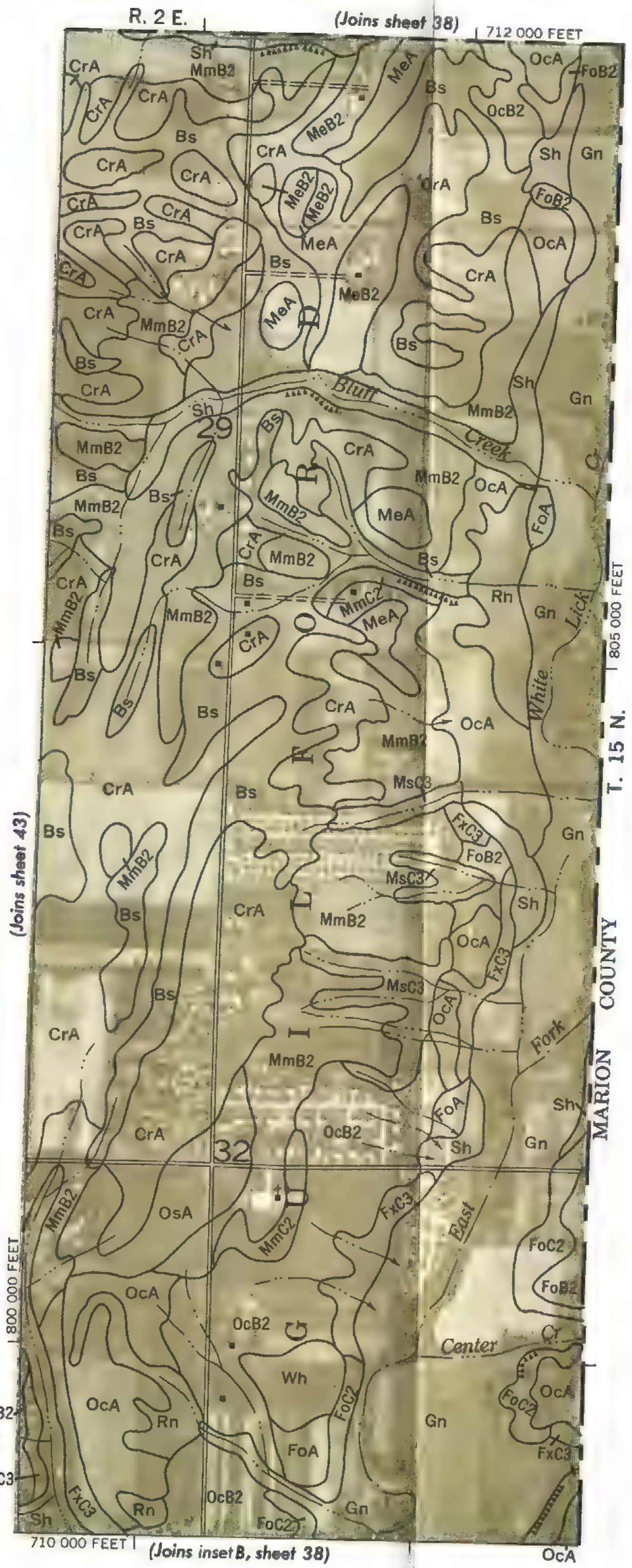
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 38

N

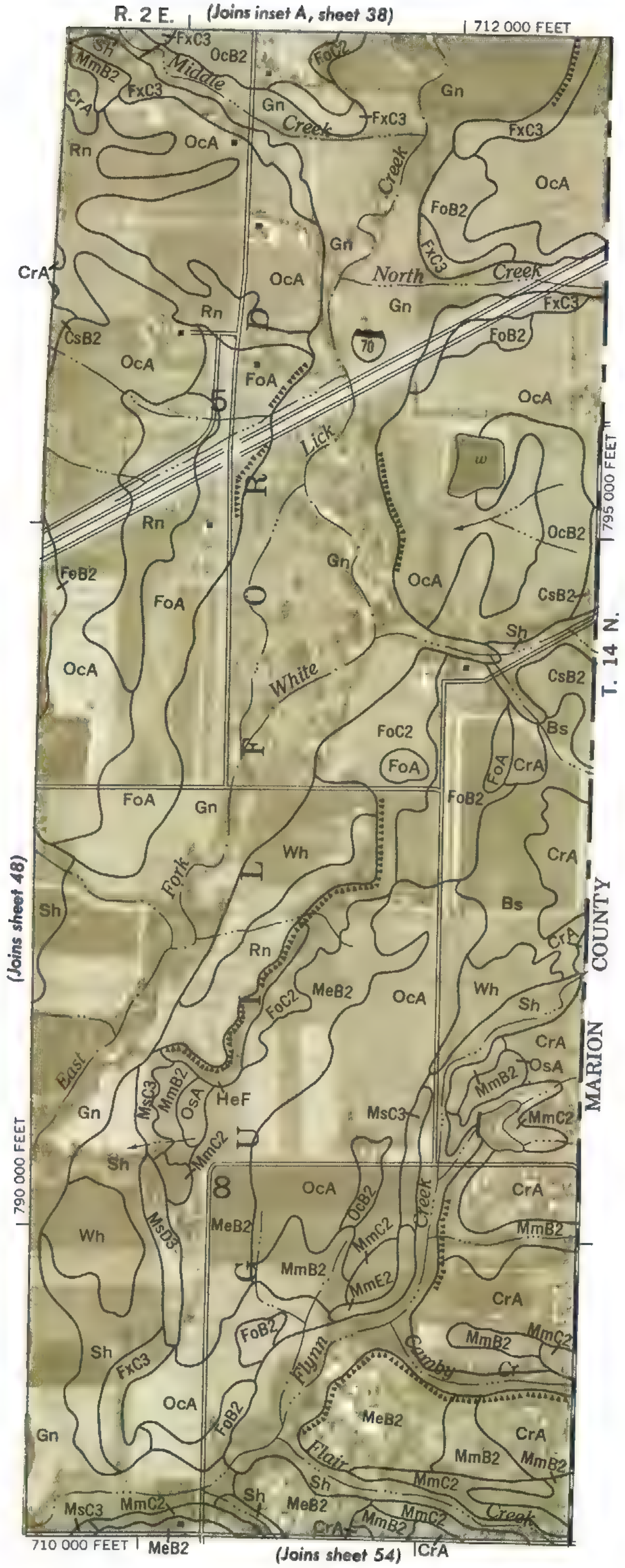
2000 AND 5000-FOOT GRID TICKS

INSET A



2000 AND 5000-FOOT GRID TICKS

INSET B



2000 AND 5000-FOOT GRID TICKS

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

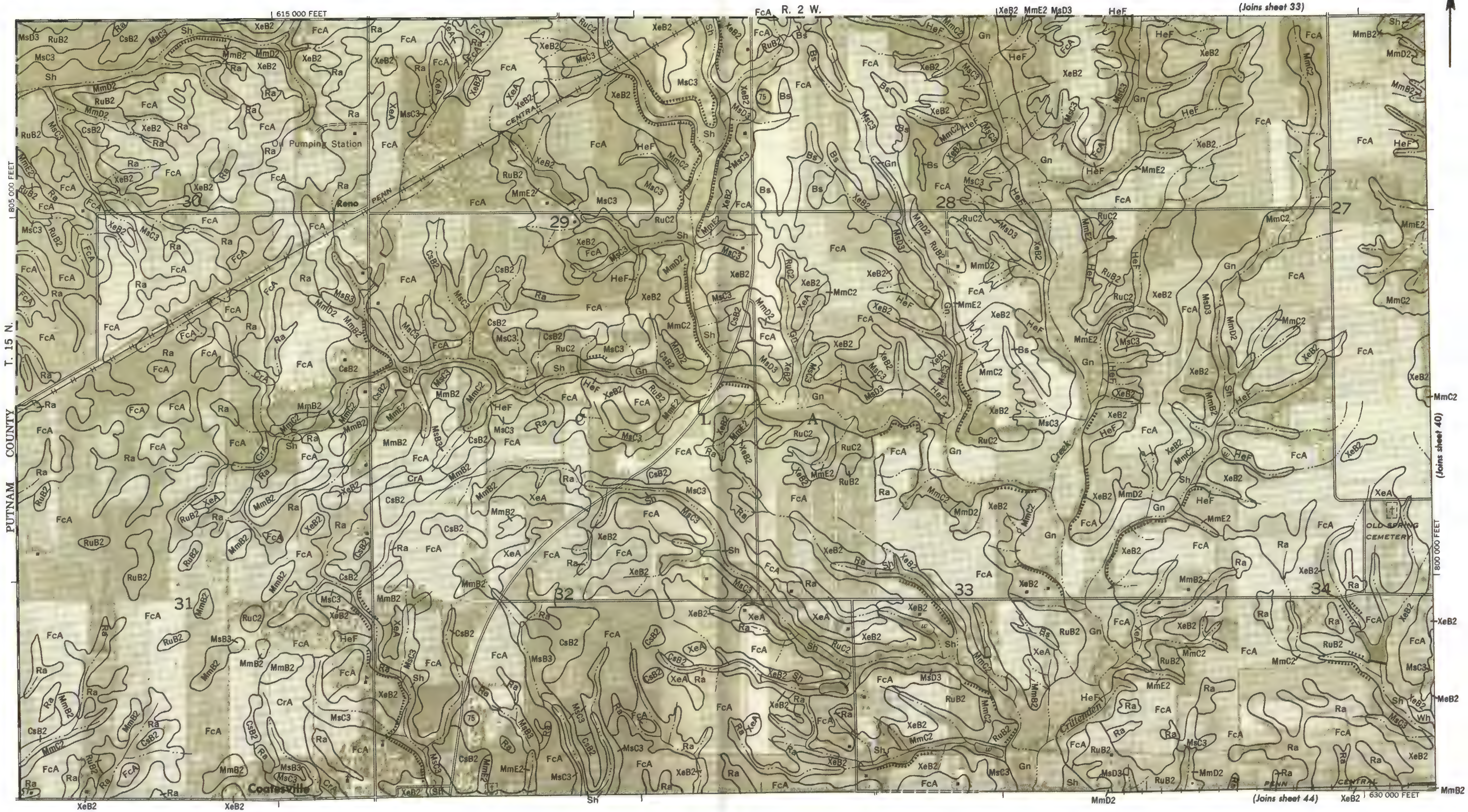
Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 38

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

N



HENDRICKS COUNTY, INDIANA NO. 39

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station. Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15 840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 40

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

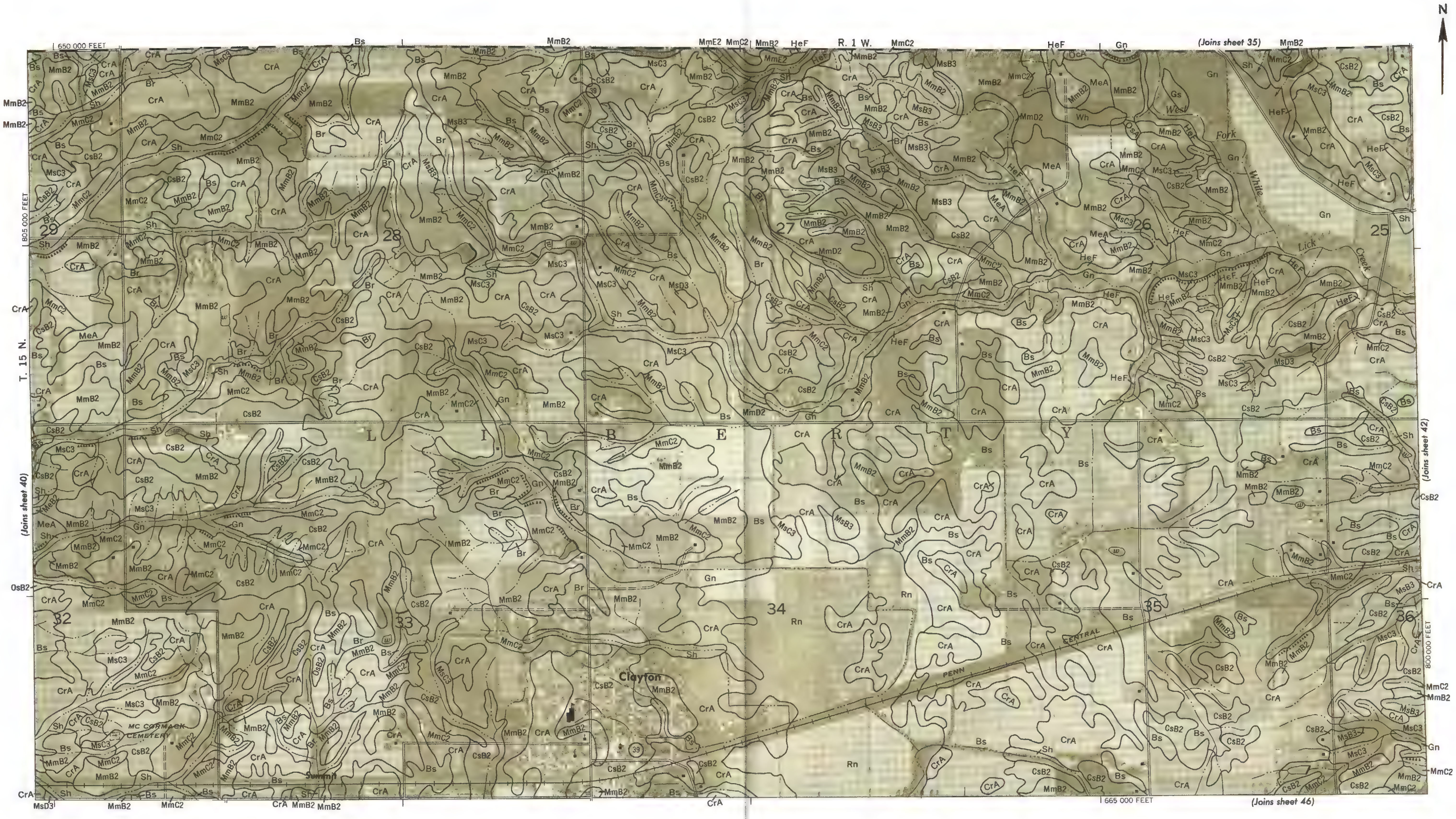
Scale 1:15840

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 40

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.



HENDRICKS COUNTY, INDIANA NO. 41

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15 840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 42

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 42

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15 840

Land division corners are approximately positioned on this map.

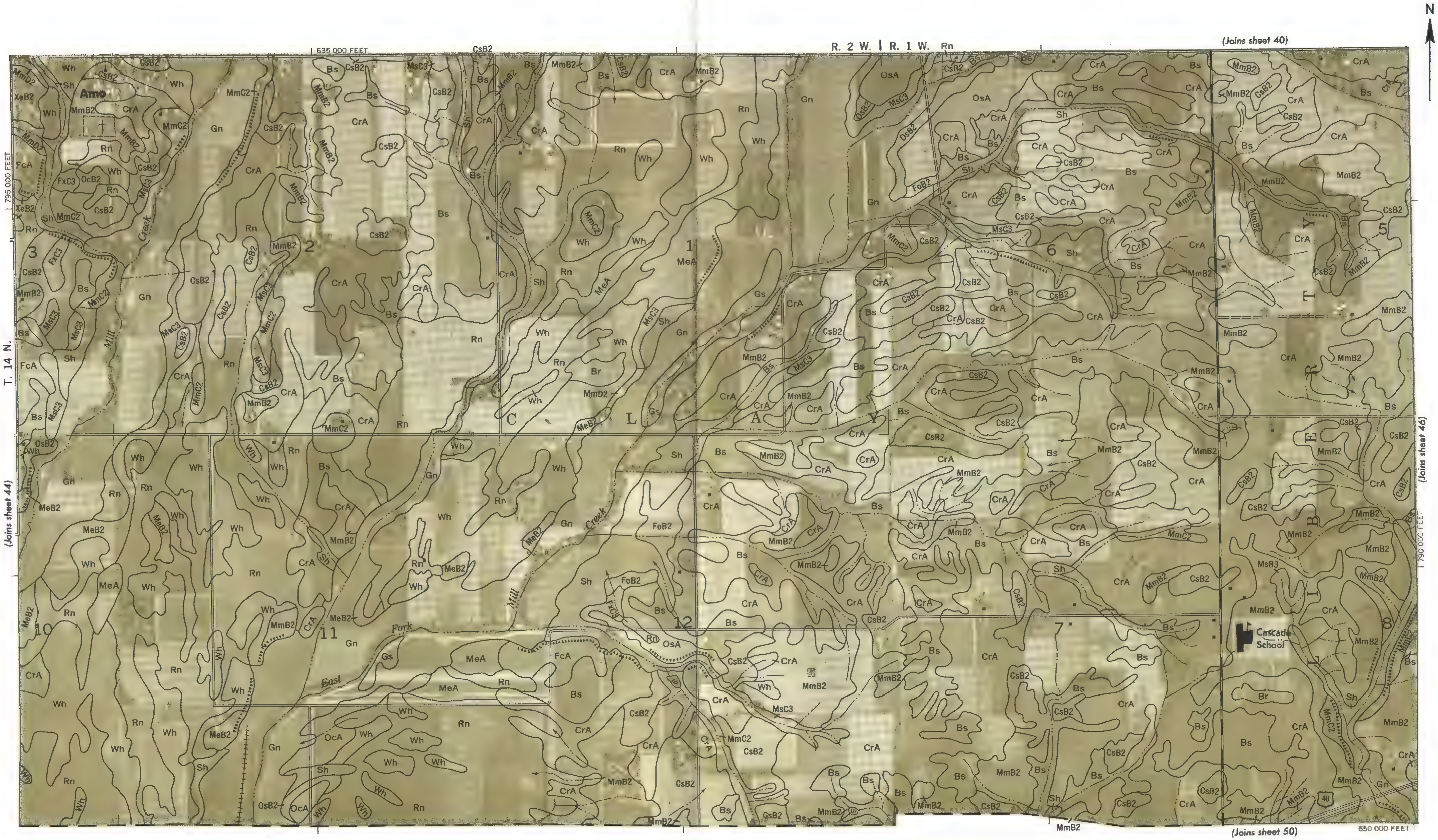
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 44

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA NO. 45

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 46

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 46

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

HENDRICKS COUNTY, INDIANA NO. 47

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

N

1 ¾ ½ ¼ 0 1 Mile

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

Scale 1:15 840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 49

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station. Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA — SHEET NUMBER 50

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

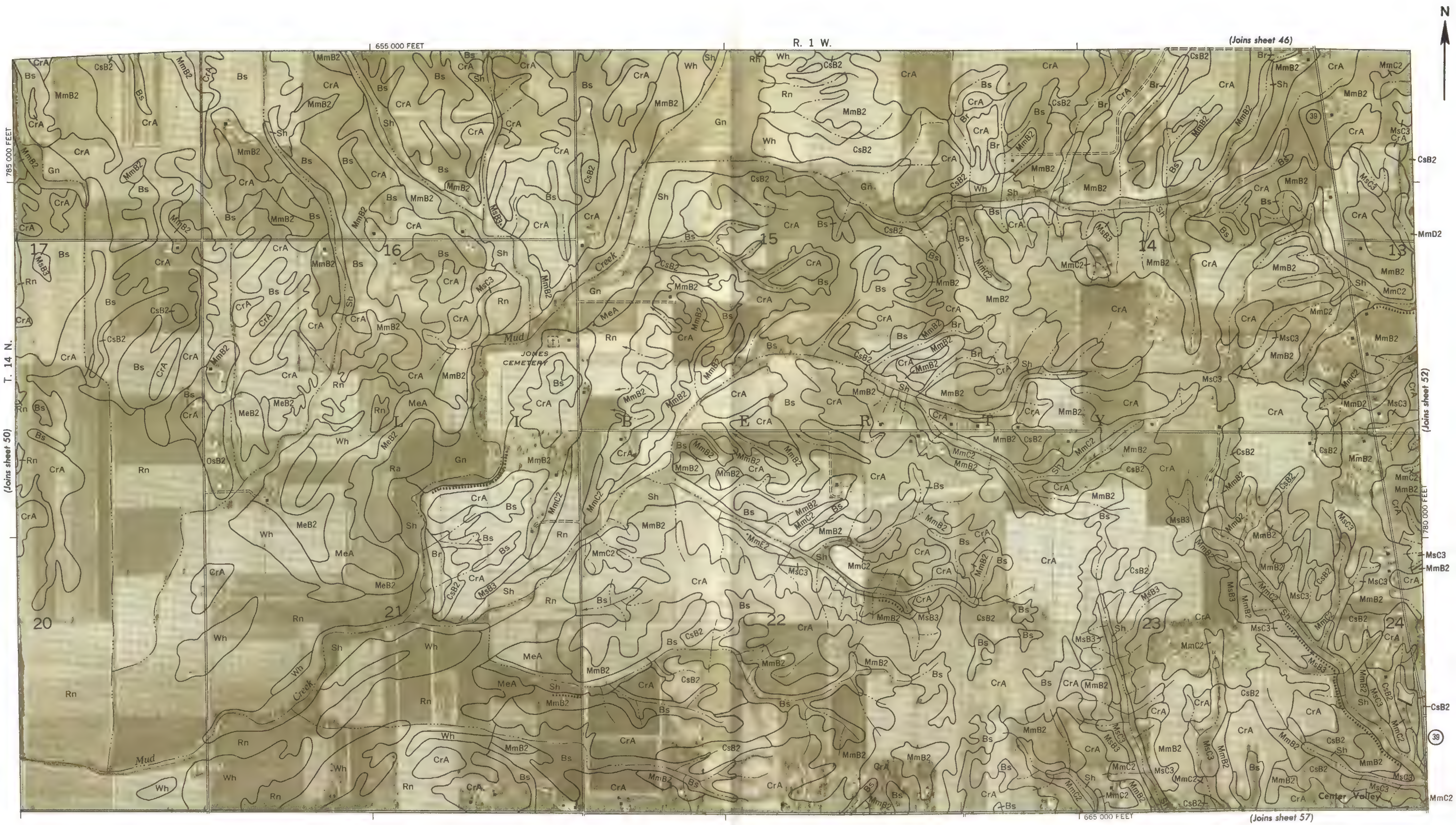
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 51

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

N

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15 840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA NO. 53

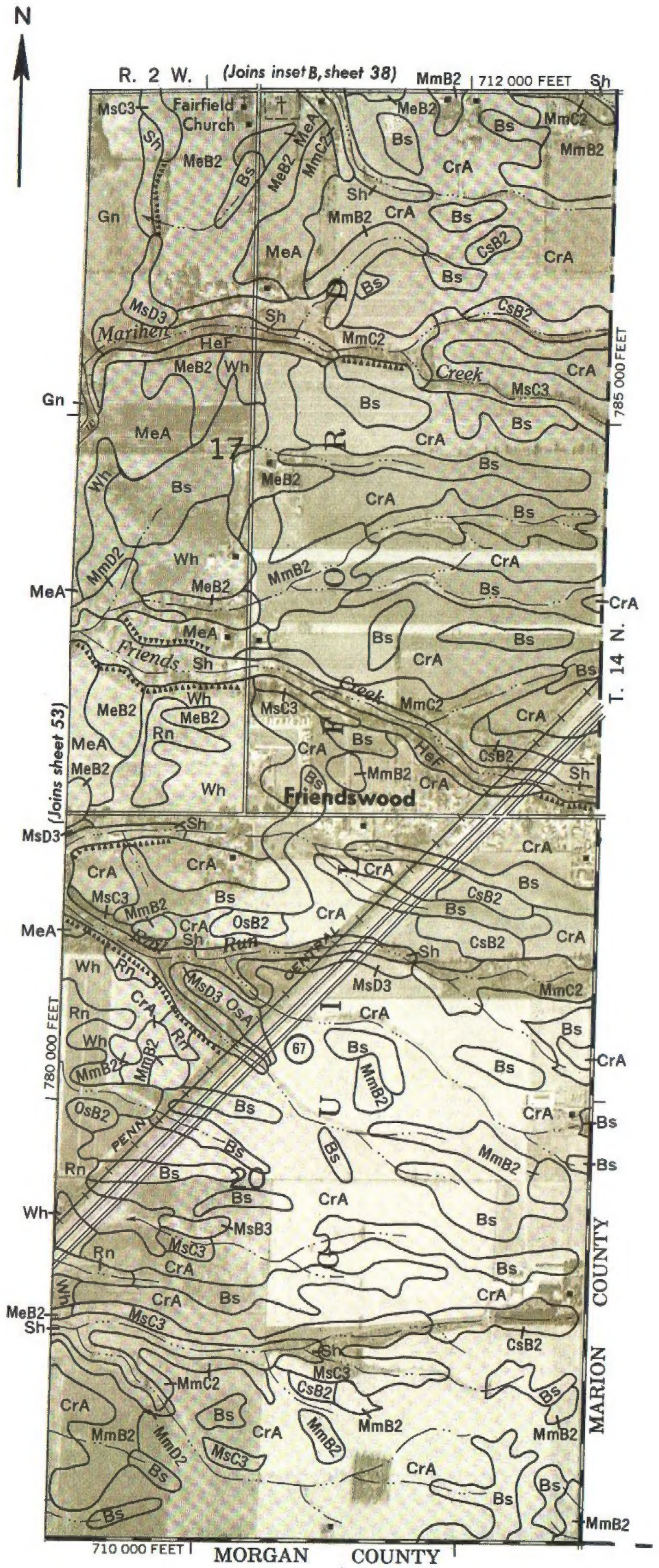
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

1 — ¾ — ½ — ¼ — 0 — 1 Mile

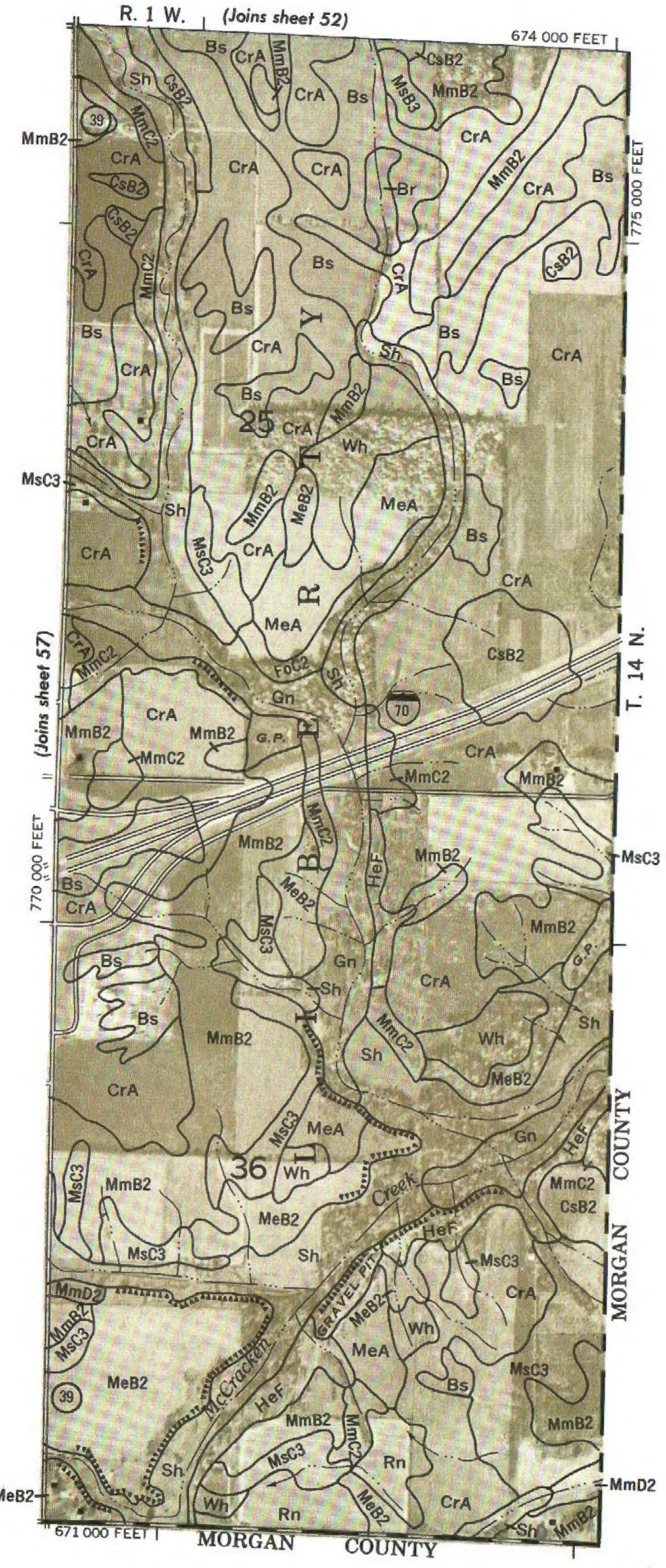
5000 — 4000 — 3000 — 2000 — 1000 — 0 — 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.



2000 AND 5000-FOOT GRID TICKS



3000 AND 5000-FOOT GRID TICKS

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

Land division corners are approximately positioned on this map.

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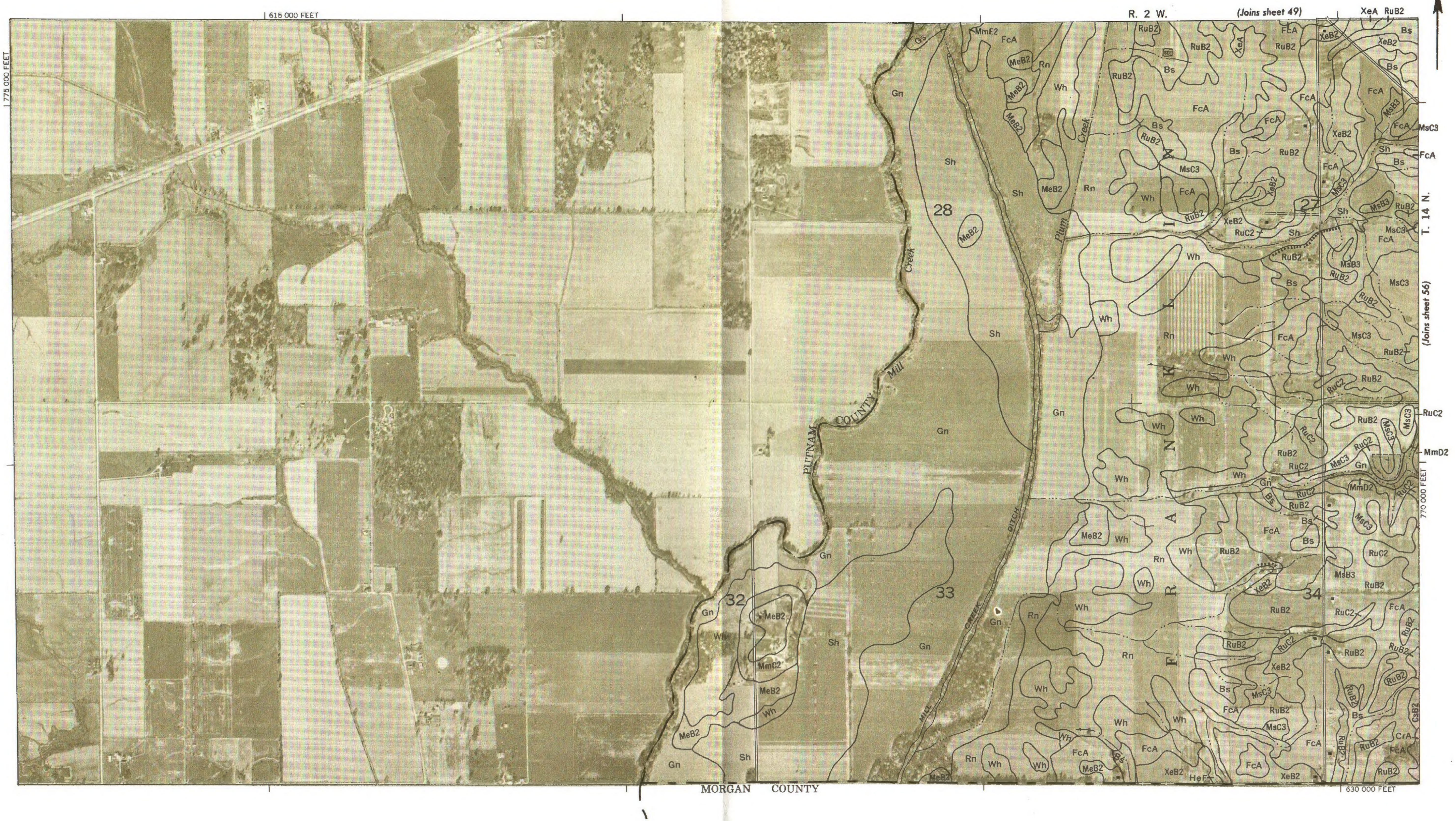
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

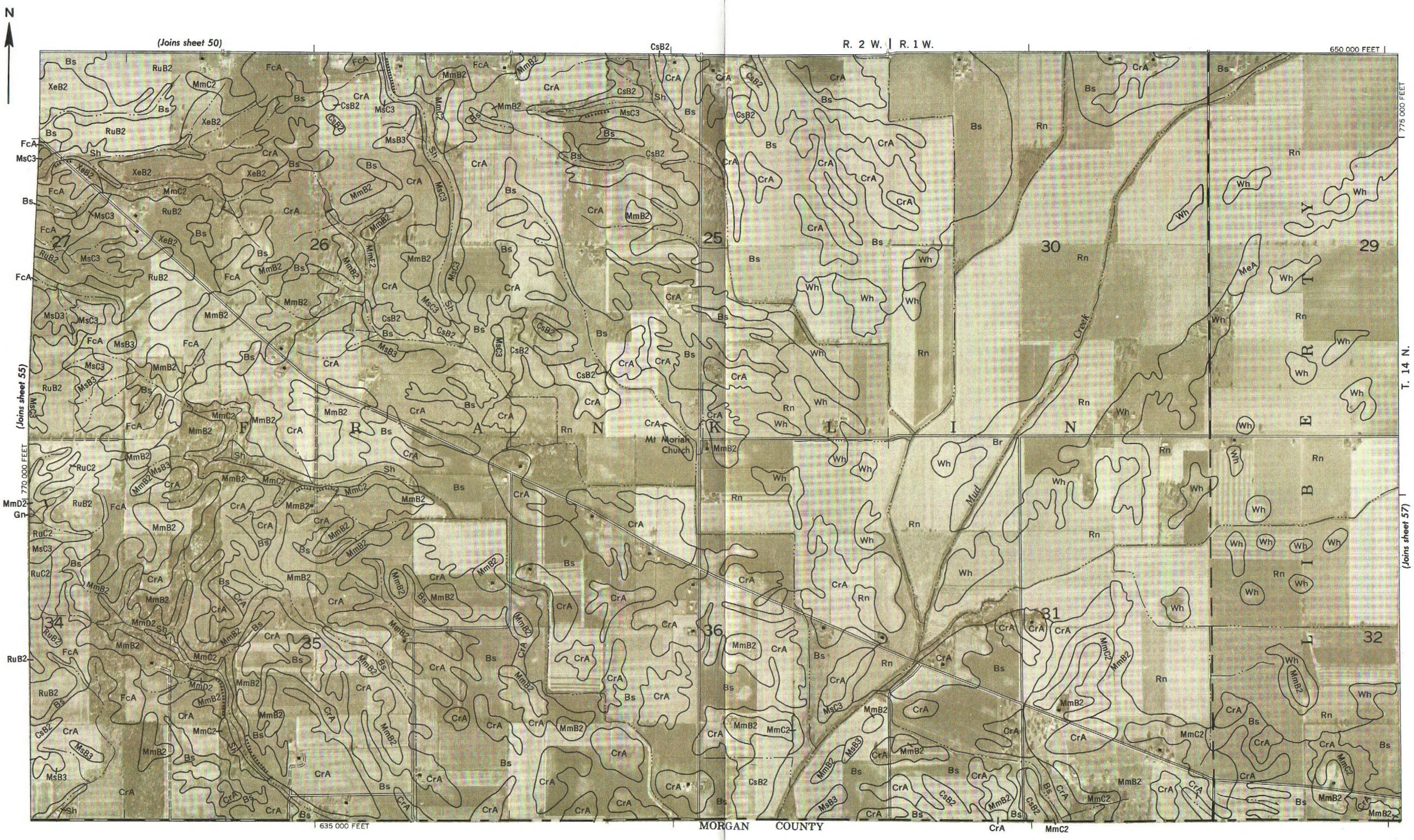


1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15 840

Land division corners are approximately positioned on this map.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Purdue University Agricultural Experiment Station.

HENDRICKS COUNTY, INDIANA NO. 56

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.

HENDRICKS COUNTY, INDIANA NO. 57

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and the Purdue University Agricultural Experiment Station.
Land division corners are approximately positioned on this map.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:15840

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Indiana coordinate system, west zone.